Electrical Review

Vol. 76—No. 19. CHICAGO, SATURDAY, MAY 8, 1920. Page 755.

Effective Methods of Lighting Banking Institutions

Interiors May Be Artistically Illuminated to Bring Out Architectural Beauty, Provide Adequate Lighting for Working Purposes and Maintain Dignity in Keeping With a Banking Institution

By J. L. STAIR

Chief Engineer, National X-Ray Reflector Co., Chicago.

The financial center of a community must have imparted to it, by architectural treatment and by furnishings, an atmosphere of conservatism, refinement and dignity entirely lacking in garish display or in anything that may give a suggestion of unsoundness. The entire scheme of especially those portions of the banking house frequented by the public proposes to impress the customer or the prospective client with the sterling solidity of the institution, and thus create the feeling of trust and confidence so essential to its existence and healthy growth.

Only a few years ago it was a rare thing to see the advertisement of a banking house. Today, however, it is regarded just as proper for the banks as for any other kind of business establishment to employ the usual mediums and methods of publicity to proclaim the benefits of

Fig. 1.—Bank at Napa, Cal., Lighted by Means of Fixtures Suspended from the Ceiling Panels.

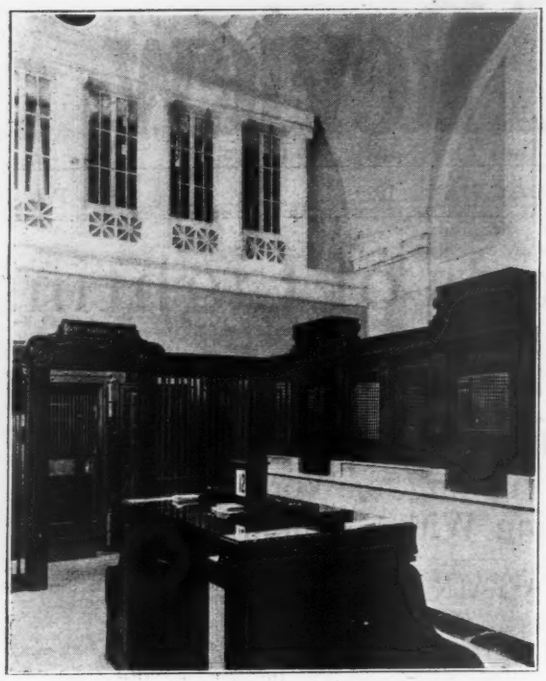


Fig. 2.—Capital State Bank, Chicago, Lighted from the Top of the Bank Rails.

its special service in an effort for increased deposits or to stimulate greater exchange of money within its walls.

Effective Lighting Is Used in Many of the Modern Banks.

Attractive buildings are an important feature in the development of new business. Looking back over the past decade, we find that the construction of new banks has progressed at a remarkable rate, and that among the outstanding features of these new buildings are the lighting arrangements. Recently a nation-wide investigation was made of the problem of bank advertising and service. The result of this research indicated that the effective lighting of the building is one of the greatest factors in emphasizing the bank's individuality. The warmth of a cheerful banking room is pleasing to the customer, does much to retain his confidence and assists in shattering, in the minds of some, the fallacy that the bank is merely a stone vault or cold storage for money.

Artistic effects are sought by expensive decorations, marble work and bronze grills. These effects are frequently ruined by the glare from lamps improperly placed or inadequately shaded. The eye, instead of being impressed by the handsome interior, is attracted by the harsh brightness of the light sources themselves. The lighting system of the banking room should, of course, be in harmony with the general treatment of the interior. It should bring out the architectural beauty, it should create a comfortable and attractive atmosphere and, furthermore, it should be a practical system, one which will provide illumination of proper quality and quantity for the public space and of correct intensity for the working areas.

Banks May Be Attractively Lighted in a Number of Ways.

Attractive and practical lighting results may be secured in a variety of ways. Banks may be lighted by means of fixtures suspended from the ceiling, from special lighting boxes, from units in the top of the bank screens or partitions through skylights, or from brackets on posts and pilasters.

Fig. 1 shows a reproduction of the interior of a typical small bank decorated in a pleasing manner, in light tones. A simple and logical treatment of the lighting problem is suggested by the manner in which the ceiling is divided architecturally by beams. By supporting two indirect lighting fixtures of harmonious design in each of the ceiling panels a very gratifying result is obtained. Other arrangements of fixtures are readily suggested by architectural conditions or by some special features peculiar to the particular area or space to be treated. Each condition or set of conditions requires individual consideration if proper fixtures and lighting effects are to be secured. A layout ideal as to fixtures may be entirely inadequate in illumination, or a room well illuminated may be spoiled by the use of inappropriate fittings or fixtures.

The use of the pendent ceiling fixture is the typical or usual solution of the lighting problem. It is found, however, that ceiling fixtures are not always necessary. In fact, the most interesting and often the most harmonious results are obtained by entirely discarding the suspended fixture. Fig. 2 shows an example of how lighting and architectural arrangement can be co-

Fig. 3.—Interior of Bank at Kentland, Ind., Showing the Appearance from the Floor Level.

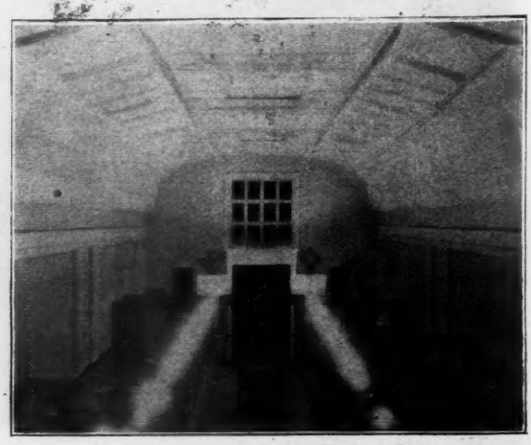


Fig. 4.—Interior of Bank at Kentland, Ind., Showing the Location of Light Sources.

ordinated. The illumination in this case is by means of indirect units located in boxes mounted upon the grill work above the wicket. Each lighting box contains two special reflectors with 100-watt lamps. Auxiliary lamps and reflectors are placed above the central skylights and spaced so that the glass is uniformly illuminated.

Lamps May Be Concealed in the Cornice or in the Partitions.

Oftentimes the lighting units are placed in the top of the bank's partition in a continuous row, instead of localizing them at specific points, as shown in Fig. 2. The cornice then forms a trough in which the reflectors are entirely concealed from view. The architect of a bank in Kentland, Ind., utilized this idea and designed the bank furniture to contain the reflectors and lamps. The units thus placed are aided by others located above the ceiling skylight. Fig. 3 indicates how nearly perfect the light is distributed over the ceiling area and how uniform and diffuse is the illumination in the banking room. Another view, taken above the normal eye level, is given in Fig. 4 and shows the disposition of the reflecting equipment in the trough or compartment in the bank partition.

One of the most infrequent methods of lighting for the banking interior is by means of a skylight only, as shown in Fig. 5. This glass ceiling is the principal means of supplying daylight for the room. The daylight effect may be approximated at night by suspending units above the glass. Skylight illumination is very desirable because of its almost perfect diffusion and softness. To be satisfactory, this method should employ reflectors of the highest efficiency, correctly designed to give a uniform ceiling brightness.

A novel and interesting example of lighting without ceiling fixtures is to be found in the banking rooms of the general offices of the American Express Co., in New York. Bronze brackets, designed to harmonize with the architecture of the building, located on the columns and pilasters furnish all of the general illumination for the room shown in Fig. 6. The ceiling is left clear and unobstructed. The absence of ceiling fixtures tends to give the interior a more spacious appearance, and gives a good illustration of how lighting effects may be used not only for illumination but for assisting the decorative scheme of the interior of a banking instiution.

Fig. 6.—A Banking Room Lighted by Means of Column and Pilaster Brackets.

Fig. 5.—An Example of Banking-Room Illumination, with all Light Supplied Through a Glass Ceiling.

Lighting of Various Rooms of the Household

Fifth of a Series of Articles on Residential Lighting—Application of Principles and Methods of Lighting—Types of Fixtures—Selection of Incandescent Lamps — Influence of Lighting Effects

By M. LUCKIESH

Nela Research Laboratory, Cleveland, Ohio.

In the third and fourth articles of this series the lighting of the living and dining rooms was discussed. Some of the principles are applicable to other rooms, but there are various principles involved in the other rooms of the modern home which have not been covered.

Reception Hall.

In the reception hall a ceiling fixture is usually most practicable, but an outlet may be provided for a portable lamp. This fixture may be an elaborate lantern of silk or of colored glass panels. A touch of color at this point is effective, but the intensity of illumination should be greater than is usually found. In fact, reception halls are often dingy, despite the impressiveness and utility afforded by adequate lighting.

Library or Den.

The library or den is quite similar to the living room during its quiet occasions. Satisfactory reading lamps should be available, and the baseboard and wall receptacles should be laid out after due consideration of the arrangement of the furniture. Restfulness is the keynote of such a room and too much general lighting or glaring brackets and other fixtures defeat this ideal.

The sun room partakes of the characteristics of the living room, but it is generally smaller. Portable lamps for reading purposes are desirable. General lighting, when the occasion demands it, may be obtained by means of a portable lamp supplying an upward component. Owing to the nature of the room a central fixture simulating a flower basket or imitation flower boxes on the walls in which lamps are concealed may be utilized for supplying the general lighting.

Bedrooms.

In the bedrooms the best arrangement of the furniture should have been determined, in the case of new houses, before the windows were located. It then becomes easy to determine the positions of the outlets if certain principles are understood.

A wall bracket about 6 ft. above the floor may be located on each side of the dresser. A distance of 5 ft. between these two brackets is desirable, even though the dresser may be much less in width. This distance tends to reduce the glare, but if the shades are dense there is no discomfort experienced in the bedroom because the wall coverings are usually of light tints. A baseboard outlet should be provided for small dresser lamps, or for brackets mounted upon the dresser. The dressing table is treated in the same manner, but inasmuch as the user is usually seated the brackets should be lower. However, in this case it is best to provide a baseboard receptacle for dresser lamps.

A baseboard outlet near the head of the bed provides a connection for a portable lamp, a form of lamp which is both decorative and useful in the bedroom.

The room may be wired for a central ceiling outlet, but a fixture at this point does not provide proper lighting for the important places, such as the dresser and dressing table. A central ceiling fixture, if used, should be depended upon only for general lighting of moderate intensity except in very small rooms. A tinted inverted bowl with possibly an appropriate hand-painted design is a desirable unit for this purpose. Another unit which may be equipped with a decorative shade harmonizing with the draperies is shown in Fig. 1.

The closets should be wired for a pendent lamp if they do not receive sufficient daylight and artificial light.

Sewing Room.

The sewing room in a middle-class home is usually a small room which sometimes serves as a bedroom. A central fixture is a fair compromise for a small bedroom, but for sewing an intense local illumination is desirable. If the room is definitely set aside for sewing purposes a pendent shade may serve well, but it is desirable to provide a baseboard outlet for a portable lamp. The Mazda daylight lamp has been found useful for sewing purposes.

Bathroom.

The problem in the bathroom is to provide a suitable arrangement of lamps for the mirror. The solution of this problem is very simple, despite the many devices which have been designed. In order to see an object it must be illuminated, whether it is viewed directly or its image is viewed in the mirror. Two light sources—one on each side of the mirror—at a height of 60 or 65 ins. serve the needs very well. They are low enough to eliminate annoying shadows during such operations as shaving, and one being on each side the face is well illuminated. The light sources are well out of the direct line of vision and no discomforting glare is experienced if small, dense upright shades are used. In fact, pull-chain porcelain sockets containing diffusing lamps are usually satisfactory. These fixtures provide satisfactory general lighting for the bathroom.

Stairways are best lighted by ceiling balls or bowls controlled by the usual three-way switches. Fixtures of the same character are satisfactory for halls and vestibules.

Kitchen.

The most common error in the kitchen is to suspend a combination fixture from the center of the ceiling. Owing to the gas burner this must extend considerably below the ceiling and is often inconveniently in the way. Besides, this low position of the light source reduces its effectiveness. A combination fixture is valuable for emergencies, but it should be a wall bracket. The central fixture should be an open glass reflector equipped with a diffusing Mazda C or daylight lamp. Wall brackets should be installed over the important places such as the stove and the sink.

At entrances it is advantageous, when appearances permit, to place the lighting fixture near the side on which the door opens and at a point not too high. This makes it possible to distinguish the features of the caller. An illuminated house number is an appreciated convenience, whether this is illuminated by the entrance fixture or is a self-contained unit with translucent glass on which the numbers are placed.

Porch.

The best fixture for the porch is an inclosed unit such as a ceiling ball or bowl. This is often merely a ball frosted on the inside, and although sometimes satisfactory in interiors where much light is reflected by the walls and ceiling, it is much inferior to a prismatic globe which directs the light downward. Much reading is done on porches in the summer time and a directive unit, even though it must be an open prismatic reflector, is quite desirable. Light is lost at the open sides of the porch and the ceiling and wall of the house do not contribute a great deal of light by means of reflection.

Basement.

The basement of a house is often very much neglected from the standpoint of artificial light. Usually a light source in the center of the basement near the heating plant is considered sufficient. Nevertheless, a number of outlets in the basement is appreciated very much. One at the bottom of the stairs or on the stairway assures safety in ascending and descending the stairs. A light source above one end of the laundry trays is desirable and for this purpose a 100-watt or a 150-watt Mazda C-2 (daylight) lamp is quite satisfactory. Outlets in the fuel bin, toilet and fruit closet are desirable and snap switches at the entrances of these rooms are convenient.

Types of Fixtures.

In the foregoing discussions fixtures have not been discussed from an artistic standpoint. Period designs are determined by the furnishings and decorative scheme, and the artistic features of fixtures are purely matters of taste. There is much glassware which is finished in charming tints and with painted and etched designs. Fixtures should shield the light source from the eyes and the diffusing media, whether glass or textile, should be dense enough to avoid glare. No fixture can be beautiful and no lighting effect can be artistic if glare is present. The householder and all with whom he comes into contact in the lighting of his house must appreciate that fixtures are a means to an end—a lighting effect—if the potentiality of lighting is to be enjoyed.

Light is a medium superior to the decorator's media in producing certain results. It is mobile, but this mobility can not be utilized without adequate outlets and controls supplemented by fixtures which possess definite aims. The most desirable fixtures are those from which two or more different lighting effects are obtainable. With equipment of this character the householder will find in lighting one of the most fruitful sources of interest and pleasure and his present indifference will change to keen enthusiasm.

Fig. 1.—Lighting in the Bedroom.

The ceiling fixture shown has decorative advantages in the bedroom. When augmented by brackets or dresser lamps the effect may be all that is desired.

Incandescent Lamps for the Home.

A vast variety of lamps are available, and this results in some confusion to the householder. Why does not the fixture dealer, after installing the fixtures, supply a chart containing the proper information regarding lamps to be used in various fixtures? After a careful inspection, such a chart can be made out and if the householder is interested enough to alter certain lamps to suit his taste he can make the change on the chart.

For the home all-frosted, bowl-frosted or other diffusing lamps are generally most desirable. Even when the lamps are entirely shielded from the eyes, as is the case, for example, with inverted bowls, the lighting effect is more desirable with frosted lamps than with clear ones, owing to the absence of harsh shadows. Bowl-frosted lamps are generally best in pendent shades, such as those of a shower, for the unit not only possesses a more desirable appearance

but the possibility of glare is reduced. The Mazda C lamp, owing to its higher efficiency, should be used wherever it can replace the less efficient vacuum lamp. A Mazda lamp possessing a white-glass bulb has been introduced recently which has a field in residence lighting. The Mazda C-2 daylight lamp has been found satisfactory in special fixtures over the dining table, for purely reading purposes, in the sewing room, in the kitchen and in the laundry.

Much can be done with tinted lamps. Many persons desire the warmer tint of the older illuminants, and, in the absence of such a lamp, some are still using the carbon-filament lamp. Experiments with modern filament lamps tinted to match the candle flame in color have been made for several years and their efficacy in making a home more cheerful and inviting is well established. In some cases where the wall coverings are of a decided yellow color they augment the color perhaps too much.

It appears that the future will witness a wide application of tinted lamps because it is logical that the modern civilization should take advantage of lighting as a means for introducing the magical drapery of color. Tinted light may be handled in a manner similar to the use of color in various arts. For example, a general illumination from warm yellow-tinted lamps may be kept alive by vital sparks of complementary color. In more pretentious rooms elaborate color schemes may be worked out. In fact, in this direction is to be found the line of future progress which will eventually lead to the development of lighting as a fine art.

Fig. 2.—Lighting in the Kitchen.

An excellent type of ceiling fixture for the kitchen, but a wall switch is preferable to a pull-chain socket. Light sources over the sink and work table add to the satisfactoriness of artificial lighting even in the small kitchen.

Lighting Effects in Home Express Taste of Householder.

The lighting equipment of a house and the lighting effects obtained therefrom express the taste of the householder. Light is a powerful medium which may enhance the charm of a home or through indifference and carelessness in its use it may tend to destroy the beauty of the decorations and furnishings. In fact, the most delightful surroundings may be changed into an uninhabitable abode by light misapplied.

A century ago civilization was struggling along with *mere* light. As the nineteenth century advanced this gradually evolved into *more* light, but the age of *adequate* light did not arrive until after the advent of the twentieth century. During this span the cost of artificial light decreased to one-fiftieth of its initial value. Is it not worth while to bring this to the attention of the householder and to arouse his sense of comparative values?

The average householder is today paying about 5 cents per day for artificial light, the importance of which is emphasized only by depriving him of it. The cost of artificial light for several hours per day in the middle-class home is comparable with the cost of a street-car fare, the daily papers, or cream in the coffee for one person. From the standpoint of cost there can be no argument against artificial light. From the standpoint of its effectiveness there are powerful arguments in its favor.

The next article of this series by Mr. Luckiesh on the subject of lighting and the householder will deal with the wiring of a middle-class home, and will include diagrams indicating adequate circuits, outlets and controls for a dwelling of two stories and basement. It will appear in an early issue.

STATE ISSUES ORDERS FOR USE OF AUTOMOBILE LIGHTS.

The Industrial Commission of Wisconsin has issued a set of general orders, effective May 1, 1920, dealing with the various uses of lamps on motor vehicles. These orders are numbered from No. 2150 to No. 2159, and give definitions of the various terms used as well as prescribing the limiting conditions relative to the legal use of lamps on vehicles.

The orders designate the time when lights are required, the intensity of illumination required on the roadway, the maximum intensity of illumination allowed above the pavement, the general characteristics of allowable spotlights and the proper uses of head, tail, front and trailer lights. The orders also contain items relative to the color and size of lamps that may be used. A special section relates to the lighting required or allowed on vehicles parked on highways.

ELECTRIC VEHICLE ASSOCIATION MEETS IN CHICAGO.

The Electric Vehicle Association held a special meeting at the Morrison Hotel, Chicago, May 7, at which E. C. Cooley, principal of the Chicago Continuation Schools, told the association about the course of instruction on electric vehicles about to be added to the subjects taught in the school. In the absence of Chairman George B. Foster, George H. Jones, Chicago, presided at the meeting.

NEW ENGLAND INSPECTORS WILL MEET IN HOLYOKE.

Open forum discussions will mark the May meeting of the Western New England Association of Electrical Inspectors at Holyoke, Mass., May 12. Six subjects covering a wide range of subjects connected with the electrical code.

Proper Illumination a Factor in Increased Production

Proper Selection, Location and Use of Lamps and Reflectors Tend to Increase Efficiency and Morale of Workmen, Decrease Waste and Spoilage of Materials, Thus Increasing Production

By OTIS L. JOHNSON

Illuminating Engineer, Benjamin Electric Manufacturing Co., Chicago.

The cry of the industrial world is to "increase production." This cry is sounded from the platform, in current and technical magazines and in the daily press. It is one of the lines of endeavor now being followed by the peoples of the civilized nations to stabilize the markets and to lower costs. In other words, it is an attempt to bring about a condition which will increase the purchasing power of the dollar, whether that purchasing power be used in buying food and clothing or services of employes.

There are many ways of obtaining increased production, one of the most important of which is the proper use of electrical energy. Electricity is still in its infancy, but even now has grown to be a prominent factor in the industrial world. Without it, manufacturing would be stagnated and set back many years. There are many applications of this potential force, any one of which aids materially in production and, when used scientifically, enables the manufacturer to obtain greater production. Some of these applications are motor drives, electric welding, electric furnaces, electric tractors, and illumination.

Many Plants Are Not Properly Lighted.

As a means of obtaining greater production probably none surpass lighting systems designed to meet in all details the requirements of correct illumination. Many plants are so designed as to provide the very best of daylight conditions for the workman, but in most cases the artificial lighting is inadequate or improperly installed.

When the fact is taken into consideration that

An Example of Modern Illumination in a Large General Office Which Has Resulted in Increased Business Efficiency.

the average industrial plant uses artificial lighting five hours per day, based on a year's operation, it is easily proven that production is far below the maximum unless proper means of illumination are provided. Diffused daylight is the best working light and will tend toward maximum efficiency of men and machines, but when this source of lighting fails it is impossible for a workman to keep up his production record unless artificial illumination as good as diffused daylight is provided. The most skilled mechanic blindfolded or forced to work in a fog or under hazy conditions can do but little work. Still that is just the condition existing in many plants where dim or improper illumination is provided. When brought to the full realization of such inefficiency, no factory manager would allow such a condition to continue. It has been demonstrated many times that proper illumination will increase production, decrease the costs of production, improve the quality of goods manufactured, reduce spoilage and prevent accidents, but still many plants remain hampered and inefficient on account of poor lighting.

That type of artificial illumination which most closely approaches daylight is the most suitable for factory operations and must of necessity increase production because it allows operations at daylight efficiency during early morning hours, evening hours, nights and cloudy days.

Lighting Affects the Morale of the Individual Workman.

Working conditions have their bearing upon the daily life of workers. Cheerful, contented employes carry their spirit home, while the man made indisposed by fatigue and eyestrain, produced by dim illumination or glaring light sources, is apt to encounter domestic difficulties. When this happens it is impossible for the man to go back to work the next day in the proper frame of mind to work at high efficiency. To repeat this occurrence day after day results in losses in production and dividends. The best of working conditions, one of which is proper illumination, makes for cheerful, contented workmen who labor at increased efficiency because they take an interest in their work, and are better able to see the task they are performing, all of which tends towards more and better work, less spoilage and fewer accidents. It is obvious that production will be increased under such conditions.

Based on the output of industrial plants in the United States, an increase of 15% in production means the equivalent of the services of 1,500,000 men, men who do not require clothing, food, houses to live in, machines to work on or buildings in which to place the machines. Doing without the services of these men certainly is a big price to pay for an asset so easily obtainable, and illustrates the well-established rule that when a factor necessary to production is not utilized the cost of that factor is offset by the decreased production resulting.

Every progressive manufacturer is trying continually to improve the quality of his product and also reduce the cost per unit of output. Proper illumination will accomplish both, but since increased production is the main topic of this article let us consider two other important aims of the plant owner, namely, reduction of spoilage and prevention of accidents.

Material may be spoiled by inexperienced workmen, carelessness or inability to properly see the piece upon which work is being performed. Spoilage means a heavy dollars and cents loss in raw materials and uselessly expended labor. A few years ago a United States census report stated that out of $150,000,000 spoilage in this country during the year, $28,000,000 was due to poor illumination. When the remedy is so easy to obtain, such a gigantic loss as this certainly should be eliminated.

Accidents Can Be Reduced by Illumination.

About 75% of all accidents in industrial plants occur during the hours of semi-darkness and darkness. Over 25% of these accidents could be prevented if proper illumination were in use. Accidents cause a drop in the morale of all nearby workmen, aside from the suffering of the injured one. The employer must stand the monetary loss of both compensation to the injured and the decrease in production due to the lowered morale of his working force.

The Travelers Insurance Co. investigated 91,000 accidents covered by its policies and reported that 23.8%, or 21,658, were due to inadequate or improper illumination. R. E. Simpson of that company made the statement: "If we assume that only 18% of our industrial accidents are due to defects in the lighting installation, on that basis the services of 108,000 men for one year are lost annually." That such a condition should exist year after year is all the more reprehensible because of the fact that the remedy is so easily applied and has beneficial results in many ways other than in the element of safety involved. Accidents caused by carelessness, inattention or ignorance can be eliminated only by a long-continued painstaking educational campaign often involving a change in established habits. The elimination of accidents due to inadequate or improper illumination is simply a matter of purchasing approved equipment and installing it under competent directions. Humanitarian reasons demand the elimination of accidents, but aside from such reasons it is to the advantage of the employers of industrial labor to prevent this cause of lower production.

Good Lighting in the Machine Shop Brings Increased Production.

The effects which must be produced by the

proper methods of illumination are absence of glare (both direct and reflected), good diffusion, sufficient intensity of good uniformity and light from the proper direction.

Glare is that effect of light on the eye which causes strain of ocular discomfort. Upon the proper functioning of the eye depends the aptitude of the whole body. Nervousness, headaches and the general indisposition to work, which follows the abuse of the eyes, is responsible for the majority of accidents and lowered production prevalent in industrial plants. Bright light sources should be kept out of the line of vision and should also be so shaded as to eliminate reflections from machines or pieces upon which work is being performed. The impairment of vision is a slow process and may in some cases take years. For that reason the real cause of a workman's failing efficiency is not recognized. Great care should be taken to install the proper lighting equipment so as to prevent the harmful effects of glare.

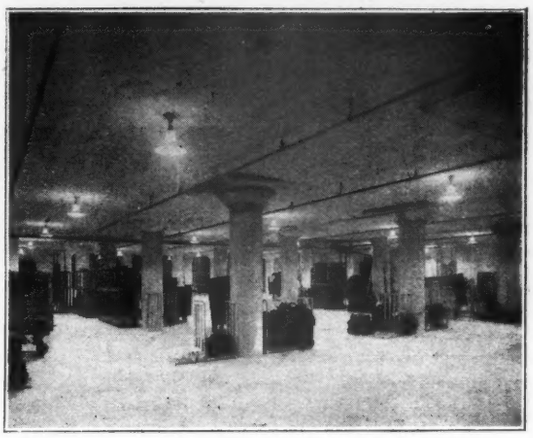
General or Diffused Lighting Is the Best.

Diffused daylight and not direct sunlight is the best natural light to work by. Diffusion tends to eliminate hard, sharp, objectionable shadows, thus preventing many accidents and speeding up production because, under such illumination, the eye sees with its greatest accuracy. Lighting units installed for what is known as general lighting produce the best diffusion. But all systems of general illumination do not prevent glare and give good diffusion because of improper spacing or mounting of the units, too shallow reflectors and unshaded light sources. Large reflecting surfaces, bowl-enameled lamps and the installation of a large number of small light sources in preference to a small number of large sources will all aid materially in producing that effect, called diffusion, which is so necessary in order that work may be performed rapidly, without spoilage and without fear of accidents. In order that men do not have to work in their own shadow, it is necessary to install a type of lighting equipment productive of good diffusion.

The foot-candle is the unit of intensity and measures the quantity or illumination. Objects are seen by the light they reflect, so it is obvious that a higher intensity is needed to see accurately when working on dark material than on light. Tables of intensity, for various classes of work, are published in state lighting codes, the bulletins of the lamp manufacturers, by the National Electric Light Association and by lighting equipment manufacturers.

Consulting engineers, architects, electrical contractors or central-station salesmen can accomplish much for their clients and humanity by insisting on the installation of proper industrial illumination. The element of cost should not interfere with proper recommendations for it is extremely small compared to the good which will accrue. For the benefit of some who may not realize the small expense involved, two comparisons are given. One is between the cost of proper illumination and labor, including the cost of installation and operation for the first year, and the second is a similar comparison except that the cost of installation is not included.

In the first comparison between labor and the cost of installing and operating a good lighting system a number of assumptions have to be made as a basis for computation. It is assumed that there are 300 eight-hour working days in the year and that artificial light is used 3.33 hrs. per day or 1000 hrs. per year. It is also assumed that each workman requires one 150-watt lamp and earns, at $1.00 per hr., a total of $2400



Illumination in a Straw-Dyeing Plant that Resulted in Decreasing Spoilage.

per year. The original installation of lighting equipment will cost $19.07 per man distributed $1.37 for a 150-watt type-C lamp, $2.70 for a standard dome reflector and $15.00 for wire, conduit and installation labor. One year's operation of this unit will cost a total of $9.83 distributed $1.15 for interest at 6%, $2.21 for depreciation at 12.5%, $0.60 for cleaning 12 times, $1.37 for one renewal and $4.50 for energy at $0.03 per kw-hr. The total cost of installation and operation for one year is the sum of these two figures, or ($19.07 plus $9.83) $28.90. This amounts to $0.096 per day or to 1.2% of the cost of a day's labor. Presented in another manner, the cost of lighting per day equals the cost of 5.8 minutes of labor.

In the second comparison, the figures are the same except that the original cost of $19.07 is not used. In this case the total annual cost of light per man is $9.83, including interest, depreciation, cleaning, renewals and energy as before. The daily lighting cost is $0.033, or 0.4% of the labor cost. This lighting cost is equal to the cost of only 2 minutes of labor per day.

Proper illumination is not an expense. It is an investment which pays large dividends in fewer accidents, less spoilage, decreased cost per unit of output and greater production.

IOWA SECTION, N. E. L. A. TO DISCUSS GEOGRAPHIC DIVISION.

Consolidation of the Iowa Section of the National Electric Light Association with the proposed Middle West Geographic Division is expected to be effected at the annual convention of the section at Colfax, Ia., June 23-25. The full program for the convention is now being prepared and will be announced later. Rex H. Fowler, Des Moines Electric Co., Des Moines, Ia., assistant secretary of the section, is in charge of the arrangements for the convention.

Relation of Electric Lighting to Safety

Magnitude of the Safety Question—Statistics on Number of Accidents—Influence of Lighting in Affording Safety in Industrial Plant Operations and in the Highways—General Considerations

By A. B. ODAY

Edison Lamp Works of General Electric Co., Harrison, N. J.

In recent years much interest has been evidenced by progressive industrial concerns in the subject of safety to their employes. This has been due chiefly to the desire of employers to assist in the welfare of their employes through the prevention of accidents and to the enactment of the workmen's compensation laws. Those prompted by the former realize that accidents have a demoralizing effect on others besides the one injured, and that each injured operator means an idle machine, or one partially so, until a new operator can be trained. In the second case, the employer is confronted by financial as well as human-interest considerations, for when an employe is injured the company is subject to claims which may reach considerable proportions and to additional loss due to the valuable training which the operator may have had and which is an asset to the company.

Consideration of safety in industrial plants has been materially advanced by the adoption of industrial lighting codes by several states. These codes specifically state the minimum lighting requirements allowable for the various manufacturing processes. As further evidence of the regard for lighting as a safety measure, many states have passed legislation prohibiting the use of glaring headlights on automobiles, and the Interstate Commerce Commission has made a rule in regard to locomotive headlights.

Magnitude of Safety Question.

The following extract from an article by R. E. Simpson, which appeared in the *Transactions* of the Illuminating Engineering Society, gives some interesting data on the relation between light and safety:

> "There is some foundation for assuming that 18% of our industrial accidents are due to the defects in lighting installations. On that basis the services of 108,000 men for one year are lost annually because the illumination provided is not adequate for the safety of the workmen. That this condition should exist year after year is all the more reprehensible, because of the fact that the remedy is so easily applied and has beneficial results in many ways other than the safety involved. Accidents caused by carelessness, inattention or ignorance can be eliminated only by a long-continued painstaking educational campaign, often involving a change in long-established habits. Elim-

A High Degree of Safety Is Realized in This Woodworking Shop Due to the Combined Agencies of Guards and a Well-Designed System of General Illumination.

ination of accidents due to inadequate or improper lighting is simply a matter of purchasing the proper equipment and installing it under competent directions. In fact, it seems proper to include illumination in the list of mechanical safeguards, for the reason that the lamps and reflectors provide a guard. Illumination points out the hazards just as effectively as a railing points out the danger of, and provides protection against, the hazard of a revolving flywheel.

"The sum involved is small when compared with lost profits on the products of the laborer or the value of the products itself. Anyone who makes an extended survey of the lighting conditions of our industries will inevitably be impressed by a much larger percentage of improper installation as compared with adequate installations. This is due primarily to the praiseworthy but none the less ill-advised attempts to better the plant illumination on the basis solely of providing a greater candlepower output. The questions of diffusion, distribution and absence of glare are either not fully appreciated or are entirely unknown, and, therefore, do not receive proper consideration."

The following statistics obtained from clippings in the files of the Safety Institute of America are indicative of the magnitude of the accident question. If any of these accidents can be eliminated by the use of better illumination, much good can be accomplished.

During 1913 there were 700,000 industrial accidents; of this number 25,000 were fatal.

Every minute 21 persons are accidently injured.

Every 5 minutes one person is accidentally killed.

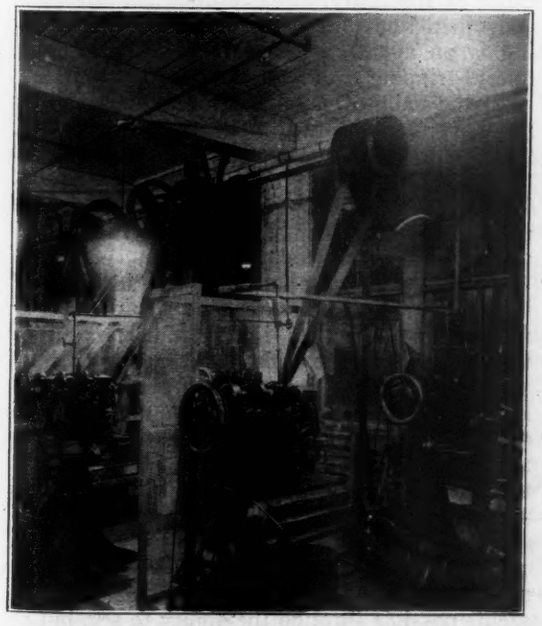
Over 11,000,000 people are either injured or killed annually; this is about 30,000 every day.

More people are killed and injured yearly than have been killed or injured in any war of the last 200 years.

Five times as many persons are killed or injured each year as die from natural causes.

One death in every twelve is due to accident causes.

A statement by F. E. Morris, chief secretary of the National Safety Council, Chicago, shows that during the 19 months the United States was in the recent war 56,000 American soldiers were killed in Europe. During the same period 226,000 men, women and children were accidentally killed in the United States.



Machine Work in a Shoe Factory Made Safe; Adequately Illuminated Permits Safe and Rapid Operation.

A Relatively High Intensity of General Illumination Renders Discernment of Detail Possible.

The annual report of the National Highways Protective Society for the year 1918 shows that in New York state automobiles caused the death of 1189 persons. In New York City alone, during the same period, 748 persons lost their lives through automobile accidents.

Relation of Lighting to Accidents in Industrial Plants.

Without really serious thought on the question one can readily see how mechanical guards over belts, saws and the like can prevent accidents by actually making it impossible for the workmen to come in physical contact with the danger source. It is not so readily evident, however, that good lighting does eliminate accidents. Let us take several cases, and by analyzing them give an insight into the part lighting plays in safe shop operation.

Consider a plant lighted solely by drop lamps with shades to prevent direct glare, with spots of brilliant illumination on the work and no general illumination of surrounding areas. A man has been working on a wood lathe; his eyes are accommodated to the high intensity at the work; he leaves the machine and hastens to get a new piece of material; possibly he has a chisel in his hand; he does not see a pile of lumber or the board that has been dropped on the floor near him and is in shadow or even darkness. He stumbles, falls and a serious cut results.

Stumbling or falling over obstructions is recognized by all insurance experts as one of the most frequent causes of industrial accidents. A reasonable intensity of general illumination is essential in every plant and is particularly important in the steel mills and the like, where hot metal offers tremendous hazards. Attempts should not be made to light the shop with local lamps alone, if the accident rate is to be kept low. In fact, modern practice provides a high intensity of illumination from overhead units through a factory, with no localized lamps, thus enabling operations to be carried on anywhere in the factory without fear of accidents due to lack of proper lighting.

In the case of an unshielded drop lamp hanging low over a machine, the workman glances at the bright filament and is blinded for an instant;

Safety Assured for Operators by Well-Designed Lighting System Bringing Out All Details.

he reaches for the belt shifter; in his helpless condition, he grabs the belt instead and his hand is lacerated. The glaring lamp is the sole cause of the accident.

Another example of the effect of improper lighting is quoted from a paper presented by a representative of the Travellers' Insurance Co. before the Illuminating Engineering Society.

> "A machine with four saws on one shaft was well guarded but the drop light had been so arranged by the operator that one of the guards caused a shadow and a man thought he was placing his hand on the guard, but instead he placed it on the shadow and was badly injured. This indicates improper lighting and it points out the hazards of the practice of permitting the workman to adjust the lighting units to his own convenience, instead of having them placed by a lighting expert, who has studied the safety problem carefully."

The same authority mentions the following instance.

> "A workman was hurrying down a dim passage through a storeroom. Some bar steel was piled at one side; one of the pieces projected beyond the others; he did not see it and with full force ran it in his eyeball, permanently losing the sight of the injured member."

One might go on for a considerable length and recite hypothetical and actual cases along this line. The situation may be summarized in the following manner.

In a well-lighted shop obstructions being more readily visible are much more likely to be removed. Even if they are not removed they are likely to be seen by the workmen and accidents avoided. Similarly, over a wide range of conditions, good illumination is the best warning of danger, facilitating the removal of the cause, and further helping the employe to see any dangerous conditions and thus avoid danger. An employe is certainly entitled to this protection. Few employers would think of letting a blind man go in among powerful machines in a workshop, yet it often happens that they render an employe partially blind by glaring or inadequate illumination.

It is impossible to so guard a sharp cutting tool that it is not possible for an operator to reach its danger point. If it is not clearly visible injury is liable to occur, even though the best obtainable device is used.

A peculiarity of good lighting is that it differs from many other safeguards in that it assists rather than impedes the workmen, thus contributing towards raising the quality and quantity of the product. In other words, it pays from every point of view.

These facts not only apply to the interior of industrial plants, but also to the yards surrounding them. In many of these yards there is a large supply of raw and finished material, and unless these places are properly illuminated accidents are liable to occur either by piles of material falling over or workmen stumbling over piled material.

Influence of Lighting on Automobile Accidents.

With the increasing number of automobiles in use, the accident hazard from this source is reaching tremendous proportion, as indicated by the figures presented in previous paragraphs. A great many of these are due, no doubt, to careless driving and lack of thought on the part of pedestrians.

It is presumably beyond our power to control these elements. Nevertheless, a certain part of these accidents have lighting as a contributing cause. Everyone, whether or not a driver, knows the blinding effect of a glaring headlight. When one of these powerful light beams strikes a person full in the eye, there is no doubt in his mind as to the total loss of ability to see for a certain period. Drivers should, therefore, keep their lights from striking the other fellow's eye, blinding him and causing a collision. The light, in general, must be kept out of the eyes of pedestrians, so that they will not be blinded, fall over obstructions in the road and be prostrated in the path of an oncoming car.

Other General Considerations as to Light and Safety.

There are many and varied phases pertaining to the subject of light and safety. On every hand there is evidence that good artificial illumination is an important advancement in the cause of humanity. For instance, in our offices, apartment houses and private homes good lighting is an agent in the elimination of accidents due to tripping over obstructions.

In the halls of public buildings it is almost a necessity, for failure to provide lighting units in these places has been a pertinent factor in litigation, resulting from accidents.

The streets of our cities require artificial light at night to make them safe—safe from the standpoint of traffic as well as protecting pedestrians from bodily harm or burglary. Accidents resulting from these causes are generally of a serious nature, and adequate illumination is therefore very important if it assists in reducing these. A police captain in one of our prominent cities made the statement that street lamps were quite as important as policemen, his belief being that the need of policemen is about in inverse ratio to the number of lighted lamps in residential and business districts.

In all walks of life and in all occupations or recreation artificial illumination is a necessity, not alone from the standpoint of making movements possible through the ability to see, but also from the humanitarian standpoint of assisting in making all of these as safe as possible.

Correction of Power-Factor with Industrial Motors

Proper Selection and Use of Synchronous and Induction Motors Produce Favorable Power-Factor and Increase Station and Line Capacities—Paper Before the Pennsylvania Electric Association

By C. W. DRAKE

General Engineer, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

The phrases "industrial application" and "industrial motor application" have come into common use during the last few years, but it is doubtful if many engineers realize the breadth or extent of the field covered by these terms. It is perhaps easier to define them by stating what is not an industrial application. As ordinarily interpreted, all motor drives except those on street railways, railroad electrifications or for ship propulsion are classed as industrial. In other words, practically all other uses of motors have something to do with the production of raw materials or their conversion into finished merchandise and may be classified under one of the numerous industries. Consequently, in discussing this subject from any angle or point of view, it is necessary either to confine the subject to certain industries, or certain types of applications which may be found in the various industries.

Raising Power-Factor to Increase Capacity and Improve Regulation.

One of the problems which is attracting much attention at the present time is that of plant power-factor, although it is a problem which has existed ever since induction motors were first installed somewhat over 20 years ago. This being the case, it is often asked why it is that so many years elapsed with little or no discussion regarding power-factor, while now it is the talk of the hour. There are numerous reasons, some having to do with the industrial plant itself, some with the transmission line and generating station, while others are largely economic. The most active factor in bringing this question to the foreground is the fact that during the last few years the generating equipment, transmission lines and transformers of most central stations have become heavily loaded or overloaded. In looking for a method of still further increasing their capacity and improving regulation, the raising of the power-factor has appeared to be the most simple and inexpensive solution.

In a plant equipped with induction motors, there is a fairly constant value of wattless kv-a. that must be supplied for magnetization. For a given energy component, that is, a certain definite amount of work performed in the plant, a definite power-factor will be obtained. Ordinarily, when speaking of raising the power-factor, it is assumed that a portion of this wattless component will be supplied by a condenser either of the synchronous or the static type. There is, however, another method of raising the power-factor which should not be neglected, and that is by carefully testing the motors and seeing that each motor is of the correct size for its particular work. In many instances the power-factor has been raised from 5 to 10% by this method and in exceptional cases it has been raised as much as 20%.

In factories using shears, punches, rolls and other machines equipped with flywheels, a very low load-factor is often obtained and a careful study should be made to secure the best combination of motor and flywheel. In many cases it will be found that the motor is installed of sufficient capacity to actually perform the duty-cycle without the flywheel.

In one mill, which had a power-factor varying from 40 to 60%, there was found a special welding roll which was driven by a 200-hp. squirrel-cage motor. A heavy flywheel was also used, but as the motor had only about 2% slip it carried practically the entire load. This load lasted only a few seconds out of several minutes, so that most of the time the motor was running idle. By a proper combination of motor and flywheel design, it was possible to use a 50-hp. motor, and so materially reduce the wattless kv-a. There are many such cases in which the motor need have capacity only sufficient to supply the friction losses while the flywheel will perform most of the working cycle.

Induction Motors Operate to Produce Low Power-Factor.

Of course, with the best arrangement, it is impossible with an induction-motor load to obtain a power-factor much over 80 or 85%, although there are numerous plants using 25-cycle service that operate at about 90% power-factor. However, the majority of plants have a power-factor nearer 70 than 90%, so some form of corrective apparatus is required to raise the power-factor to a value that will not carry a penalty in the power contract. Just what this value is, it is difficult to state, as there are nearly as many power-factor clauses as there are power contracts, but, as a rule, penalties are imposed on power-factors below 85 or 90% for large demands and below 75 to 85% for smaller demands.

It is in small or medium-sized plants where power-factor correction is generally found most difficult, as in machine shops, planing mills, and miscellaneous industries located in the cities where most of the motors are of small size and

are started and stopped at frequent intervals. Synchronous motors are not well adapted for such service, and in order to be of value for power-factor correction they must be on the line all the time that the plant is in operation.

In the planing mill, the shaving exhauster offers about the only opportunity for the use of a synchronous motor and either a belted or direct-connected motor may be used. As ordinarily installed, a fan imposes extreme starting conditions, that is, it requires approximately full-load torque at synchronous speed. Even with induction motors, it is customary to use a high starting tap in order to bring the motor to as high a speed as possible before changing over to full voltage. As the reason for installing a synchronous motor is to raise the power-factor, it is evident that the rating of the motor will depend as much on the wattless component required for the particular plant as upon the mechanical load required to drive the fan, and in cases like this, the kv-a. rating of the motor will probably be at least double that required to drive the fan. This excess capacity makes it possible to obtain the desired starting characteristics with a reasonably designed motor.

Power-Factor May Be Corrected by Use of One Synchronous Motor.

An investigation shows that there are many industrial plants having one or two places where synchronous motors may be used to correct the power-factor for the entire plant. Motors for such service should be designed practically the same as synchronous condensers, that is, to operate at nearly 0% leading power-factor, since the mechanical load in many cases may be quite small. For most of these applications, either a direct-connected or belted exciter should be used. The starting and control of these motors may now be made almost as simple as that of a squirrel-cage induction motor. In fact, there is quite an interest shown at present in automatic starters for synchronous motors, and these will undoubtedly tend to increase the use of synchronous motors in plants where it has previously been thought that there was not sufficiently skilled labor for their operation.

Many articles have been published showing simple methods of determining the size of synchronous motors required to give certain power-factor correction. Other articles have dealt with the starting conditions required by special machines such as air or ammonia compressors, but for general industrial service it will be impossible to draw up exact specifications covering such items. Each application will require individual attention, but in most cases the rating needed is two or more times the mechanical load, and normally designed motors may be used.

As a considerable portion of any central-station load is made up of miscellaneous industries like those described above, it would appear that there should be an increasing demand for synchronous motors operating at speeds of from 600 to 1200 r.p.m. and in capacities of from 75 to 100 kv-a. or larger. The installation of such machines would correct the power-factor at its source, which is the proper place, rather than to transform and transmit the wattless current to some central location to be corrected, as is now often the case.

The direct-connected, slow-speed synchronous motor for driving large air compressors has become standard, so that as far as the customer is concerned it is unnecessary to specify the motor-starting characteristics or the horsepower rating. Co-operation between the motor and compressor builders has made it possible to supply exactly the right motor for each compressor. This is also becoming true in the ammonia-compressor or refrigeration field, although more variables occur here regarding the horsepower requirements than with air compressors. Such applications, however, are best worked out between the machinery manufacturers, and the customer is principally interested in a satisfactory operating unit. Motors for such service are ordinarily designed for 100% power-factor, so that the amount of power-factor correction obtained will depend principally upon the ratio of the compressor-motor kv-a. to the total kv-a. load in the plant.

Use of the Synchronous Motor for Large Power Installations.

There are certain industries which have loads running into thousands of kilowatts where much of the load is made up of comparatively large slow or medium-sized motors. In the rubber industry large numbers of motors of from 200 to 800 hp. are used to drive mill lines, and with the usual form of gear drive, motor speeds of from 500 to 600 r.p.m. are common.

Slip-ring induction motors have been generally used on account of their high starting torque and low starting current, but as the load on these mill lines is quite variable, a low power-factor often results. Most of the present drives are equipped with magnetic clutches or clutch brakers, which, in case of emergency, disconnect the motor from the line and bring the mill line to a quick stop. The slip-ring motor has ample torque to start the load so that the clutch may or may not be used for this purpose, but the fact that clutches are ordinarily used has made it possible to replace slip-ring with synchronous motors of similar or slightly larger rating. Experience with refrigerating machinery has shown that synchronous motors may be built for extremely low speeds and yet give high efficiency and have a reasonable cost.

Consequently, it was a natural development in the rubber industry to suggest the elimination of the gear reduction and use synchronous motors at speeds of 100 to 120 r.p.m. instead of 500 or 600 r.p.m. In this case the clutch has five times as much torque to transmit and becomes a very large and expensive piece of apparatus. Other forms of braking may be used, such as mechanically operated brakes or plugging or dynamic braking on the motors. But as long as the clutch is required for starting, it probably offers the simplest method of stopping. If synchronous motors can be designed to approach the performance of slip-ring motors, that is, give full-load torque or over at starting, then the clutches may be eliminated and some other form of braking considered. The point which it is desired to make here is that the tendency

in all machine design, plant layout and motor application is towards simplicity and a minimum number of parts.

If motors can be designed to perform certain functions without the use of auxiliary mechanical devices, it is a step in advance. Many such examples may be noted, as, for instance, the elevator and reversing-planer motors which made it possible to eliminate the reversing belts, and adjustable-speed d-c. motors for machine tools which eliminated the step pulley and most of the gear box. There is no doubt regarding the ability of synchronous motors to drive rubber mills and correct the power-factor, but it is a question whether the present arrangement may be considered a logical or final solution. As it stands now, the motor characteristics meet only a part of the requirements and the clutch and brake supply the remaining ones, but it is futile to try and prophesy what the ultimate drive may be. Whether these motors should be designed for 100 or 80% power-factor will depend on local plant conditions, but, as a rule, they should be designed for 90%, and be operated at any power-factor between 80 and 100%, as desired.

Conditions Regarding Motor Equipment in Cement Plants.

Very similar conditions exist in cement plants where large numbers of induction motors are used on tube mills, crushers, etc. Many of these motors are rated at from 200 to 300 hp. In the early days of electrical development in cement plants, friction clutches were quite commonly used in connection with standard squirrel-cage motors in order to facilitate starting. After the exact starting and running conditions were better known, squirrel-cage motors of proper characteristics were produced so that the troublesome clutches could be eliminated. Most cement plants have preferred the squirrel-cage to the slip-ring motor for such service, on account of its greater simplicity, although slip-ring motors in the large capacities are now installed in some mills.

This is another example where the characteristics of synchronous motors are not adapted to the work, and their use would in a way revert to early induction motor practice with clutches. The difference now is that the advantage of power-factor correction may offset any expense and difficulty with the mechanical equipment, and it may also be assumed that much better clutches are now available than formerly. Consequently, in plants like these, it should be carefully considered whether the power-factor correction desired can best be obtained by using synchronous motors in the manufacturing processes, or whether better manufacturing conditions can be obtained by the use of induction motors and the power-factor corrected otherwise, as perhaps by synchronous motors on motor-generator sets, centrifugal pumps or synchronous condensers.

General Conclusions as to the Correction of Power-Factor.

A large part of the ordinary central-station business consists of industries which are difficult to classify either as to product or type of machinery used. In most of these industries improvement in power-factor may best be obtained by the use of medium or high-speed synchronous motors used in much the same manner as the present induction motors. The proper choice or application of these synchronous motors will fall largely upon the power engineer of the central-station company, who is generally familiar with the customer's power problems.

For any plants using compressed air or refrigeration in suitable quantities, complete equipments with synchronous motors are available, and, as a rule, very little engineering on the customer's part is required. In some cases it is possible to have the motor specially designed for the local conditions, but generally a much better proposition is obtained by accepting standard ratings.

In industries using large motors it is possible to use synchronous motors for nearly any drive by means of necessary mechanical attachments. As the principal reason for using synchronous motors is to improve the power-factor, they should be used first in those places where their electrical characteristics are best adapted, and their use in other places should be carefully considered to see if the same result could not better be obtained by some other arrangement. Industrial motor application work cannot be reduced to an exact science or formula, since the power requirements and motor characteristics are determined not only by the machine to be driven but fully as much by the method in which it is operated. Consequently each application requires careful personal consideration in order that all functions may be satisfactorily met.

FEDERAL TRADE BOARD PUBLISHES VOLUME OF DECISIONS.

The Federal Trade Commission has published the first volume of its decisions, findings, orders and conference rulings. Bound copies may be obtained from the superintendent of Public documents, Washington, D. C., for $1.50 apiece. The volume includes all cases passed on by the commission from March 16, 1915, to June 30, 1919. The printing of the volume entailed considerable expense and for that reason the commission adopted the policy of the Interstate Commerce Commission in not making general public distribution of the volume.

INQUIRY IN GREAT BRITAIN ON PROFITEERING IN LAMPS.

Prices charged in Great Britain for electric lamps is the subject of inquiry under the Great Britain Profiteering Act, a committee report being to the effect that there is a trade combination —the Electric Lamp Manufacturers' Association—which includes from 90 to 95% of the industry, controls factors and retailers, fixed prices at all stages and regulates the output.

Standard vacuum lamps now sold to the public at three shillings each (75 cts.) could be sold for two shillings each (50 cts.), the report says. The inquiry developed that half-watt lamps sold to the public in 1919 at 12 shillings, 6 pence

each, were bought in Holland by the associated manufacturers at three shillings each and a profit made on them of something like $1,000,000 over and above what the committee thinks reasonable.

LOS ANGELES SECTION, A. I. E. E., DISCUSSES ALTERNATORS.

The Los Angeles Section, American Institute of Electrical Engineers, held a meeting on April 27 at Edison hall, Los Angeles. Prof. R. W. Sorensen, of the California Institute of Technology, discussed the "Fundamentals of Alternator Design." H. H. Cox, chief operating engineer of Southern California Edison Co.'s Big Creek system, talked on "Large Unit Operations." The subject of F. C. Hanker of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, was "The Manufacturer and the Large Power Unit"; and T. E. Keating of the same company spoke on "Prime Movers in Large Units."

GENERAL ELECTRIC CO. TO PLACE PLANT IN BALTIMORE.

Following the plans outlined in his annual report by Chairman C. A. Coffin of the General Electric Co., of acquiring for expansion purposes through lease or purchase plants already built, the company is reported to have closed negotiations that will result in it taking over the former munition plant of the Bartlett-Hayward Co. at Baltimore, Md. The plant consists of 11 buildings, having 420,000 sq. ft. of floor space, and occupying a 40-acre site. The original cost of the buildings was $2,100,000, and it is reported the General Electric Co. secured them for less than $1,000,000. Manufacturing work is expected to begin in the plant about Aug. 1, with a force of 5000 men.

DEVELOPMENT OF STREET-LIGHTING EQUIPMENT.

History of Progress Given in Paper Presented Before New York Section, Illuminating Engineering Society.

By Preston S. Millar.

In 1808 Sir Humphrey Davy produced the electric arc, which is commonly considered to have been the forerunner of the arc lamp. He used charcoal electrodes supplied with current from Volta's primary battery or "chemical generator." Davy repeated the experiment before the Royal Institution in London in 1810. He stated:

> "When horizontal pieces of charcoal, about an inch long and one-sixth of an inch in diameter, were brought near each other, within a thirtieth or fortieth part of an inch, a bright spark was produced, and more than half the volume of charcoal became ignited to whiteness; and by withdrawing the points from each other a constant discharge took place through the heated air, in a space equal to at least four inches, producing a most brilliant ascending arch of light."

The discovery of induced currents (Faraday, 1831) led to the establishment of the connection between electricity and magnetism and thus to the magnetoelectric machine. This equipped with the commutator (Ampere, 1832), provided a supply of direct current with which the arc was studied experimentally during the next few decades. In 1843 Foucault improved upon Davy's charcoal electrodes by employing graphite pencils made from carbon deposited upon the sides of gas retorts. In 1845 the electromagnet was invented by Wheatstone and by Cooke. This led to the dynamoelectric machine, announced in the same year by Wheatstone and by Siemens, having electromagnets instead of permanent steel magnets, as in the magnetoelectric machine. This apparatus was brought to the stage of practicability by Gramme and others in 1870. There resulted an increase in arc experimentation.

A regulating device to feed the carbons and maintain the arc was regarded by most investigators as essential to success of the arc lamp. Jablochkoff, however, as if to prove the rule by an exception, invented a lamp without a regulator and this lamp was the first to attain commercial success in street lighting in Europe. Jablochkoff's lamp, which became known as the "electric candle," consisted of two thin vertical strips of carbon bound closely together and separated by insulating material. The exposed ends were bridged by fine carbon, which served to start the arc when the current was first applied. A number of these "candles" were placed in an opal globe, usually four in a 20-in. globe. Each lasted about one and one-half hours, at the expiration of which time the current was switched to another "candle." Alternating current was employed to equalize the rate of consumption of the two strips.

During the Universal Exhibition in Paris in 1878 the Place and Avenue de l'Opera were lighted by Jablochkoff candles. While this may not have been the first use of electric lamps for street lighting it was the first notable installation. Prof. Sillinan wrote from Paris under date of July 27, 1878, about "the splendor of the electrical illumination. The effect is magnificent and at this moment there exists nothing in this city of splendid effects to compare with this magical scene. The vista is about two-thirds of a mile, and the effect incomparably finer than any show of artificial illumination ever before seen."

Parisian Street Lighting by Jablochkoff Candles.

The candlepower of these lamps is stated in various records as anywhere from 285 to 1500.

It is probable that the actual value was of the order of the smaller of these figures.

The Jablochkoff electric candle was especially interesting because it offered a possibility of the much-sought means of "subdividing the electric light." It was costly and unreliable, however. While attaining some commercial success on the continent, it hardly progressed farther than the trial stage in England and made no progress commercially in America.

In America the work of Brush, Thomson, Houston, Weston, Wood and others provided superior arc lighting systems which became available shortly after the introduction of Jablochkoff candles in Europe and which endured for two decades. In 1876 Brush completed his first dynamoelectric machine. In 1877 two of his dynamos with a simple regulating type of arc lamp were tested at the Franklin Institute in Philadelphia. In 1878 he invented the series arc lamp with regulating shunt coil, and in 1879 developed the double carbon "all night burning" lamp.

The first public street lighting by arc lamps in this country was inaugurated in April, 1879, when 12 arc lamps were placed in service in the public square in Cleveland. Probably the most important early street-lighting installation was in New York City. Beginning with December 20, 1880, Broadway was illuminated by arc lamps from Fourteenth to Twenty-sixth street. By the end of 1881 arc lamp stations were in operation in several of the larger cities of the country.

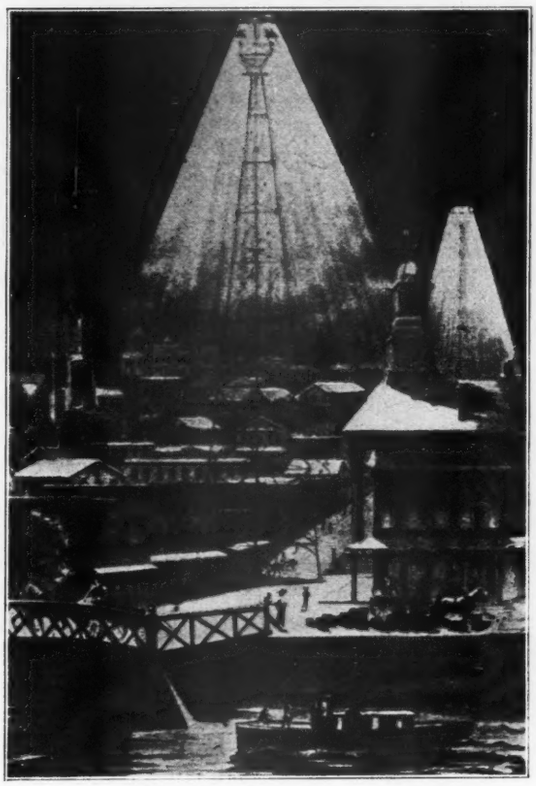
The first series machine of the Brush company was designed for six lamps. This was followed by 16-lamp machines. In 1880 40-lamp machines were produced. By the end of that year about 6000 Brush lamps had been installed. Later 65-lamp machines were built, and finally 120-lamp machines were standardized.

The strong concentration of the light from the open arc lamp in a zone about 45 deg. above the nadir led to the use in some localities of towers for supporting the lamps at a relatively great height. Probably the exaggerated ideas which prevailed concerning the power of the arc lamps led to comparison with the moon or even with the sun. The step from this to the idea of high mounting was natural. These towers may still be seen in the Middle West. They are usually from 125 to 150 ft. high, and mount from four to eight lamps. The early towers in Elgin were perhaps typical. There was a main central tower 150 ft. high surrounded by six towers each 125 ft. high and located about one-half mile apart. These furnished the principal public illumination for a population of 16,000 in an area of about 4 sq. mi.

Electric light towers were installed in Akron in 1881. One is described as an iron mast 207 ft. high held erect by iron cable guys. The lamps were lowered by machinery. Another notable installation was at San Jose, Cal., where a gas-pipe structure was erected in 1882 over a street intersection, the base resting upon the four corners. This tower was 200 ft. high and mounted four "4000-candlepower" lamps equipped with a reflector.

The further development of electric street illuminants is of recent occurrence. The inclosed carbon arc lamp was perfected about 1894, the magnetite lamp about 1904, and the long-burning flame arc lamp a little later.

Of the incandescent lamps the carbon type was never satisfactory. The metalized carbon (Gem) series lamp was but little better. The tungsten filament lamp was the first series lamp to offer really acceptable service. The gas-filled Mazda lamp is very satisfactory and has invaded successfully the street-lighting field so long occupied by the arc lamp as the only high-power illuminant.



Example of Early Electric Light Towers.

NEW DAYLIGHT LAMP DEVELOPED IN ENGLAND.

It is reported that a lamp has been perfected in Great Britain which is the closest approximation to actual daylight ever accomplished. The apparatus consists of an electric lamp bulb, fitted with a cup-shaped opaque reflector, the silvered inner side of which reflects the light against a parasol-shaped screen placed above the light. The screen is lined with small patches of different colors, arranged according to a formula worked out empirically by the inventor, and carefully tested and perfected. The light thrown down from the screen is said to show colors almost as well as in full daylight. A test was made with such articles as colored wools, Chinese enamels, pastels and color prints, each being subjected successively to daylight, ordinary electric light and the new light. Under the new light delicate yellows were quite distinct, indigo blues were blue, cobalts had their full value, and violets lost the reddish shade usually associated with them under artificial light.

EDITORIAL COMMENT

Better Lighting and the Illuminating Engineering Society

Extraordinary advances have been made in electric lighting in the last 15 years, both as regards its production and utilization. Through the development of new types of electric illuminants and improvement in some of the old the efficiency of light generation has been materially increased. At the same time almost countless new applications of electric lighting and substantial improvements in existing ones have given us greatly increased facilities for solving lighting problems of all kinds. While these developments were taking place studies were being made to determine the correct principles of lighting so that now we have a much wider grasp of both the science and art of illumination.

Many agencies have contributed to this advance, among which are the more progressive lamp, reflector and glassware manufacturers, private and government research organizations educational institutions, lighting companies and finally the Illuminating Engineering Society. Although the society has not conducted much research work directly, it has to a large degree coordinated a great deal of the lighting research carried on by others, since it has acted as a forum for the presentation and discussion of the results obtained by the bulk of the investigators in this field, who thereby have been enabled to direct further investigations without duplicated or otherwise wasted effort. The society has through several of its committees codified the best thought of the leading lighting specialists on such important matters as use and misuse of light, glare, factory lighting, school lighting, and automobile headlights. The two most comprehensive courses of lectures on illuminating engineering yet presented were prepared under the initiatory auspices of the society; popular lectures on various phases of lighting have also been prepared by the society. In its publications is found the unbiased chronicle of the lighting progress of the last 14 years, as well as the disclosure of the principles of good lighting and a mass of comments on their application.

It is no exaggeration to say, therefore, that the Illuminating Engineering Society has been, through its being the common meeting ground of all actively interested in the movement for better lighting, as well as for its direct services in behalf of that movement, the national sponsor for all well-directed efforts to improve lighting and visual conditions. It is the technical guide for these efforts and plans to be so in the future more than ever before. Its work deserves not only recognition but active support so that it may be continued on a much broader scale than heretofore.

A special membership campaign is now being conducted by the society to increase its numerical strength and influence as well as the financial resources necessary to the proper conduct of its broadened work. Although the cost of a membership is merely nominal, yet it should mean much to anyone interested in lighting to be directly associated with the organization that stands primarily for better lighting. What does better lighting mean? It means conservation of precious eyesight, better facilities for doing our daily work, more work accomplished for a certain expenditure of visual energy, greater safety in our shops and on our streets, more cheerful conditions in the home after the day's tasks are done; in short, more happiness and enjoyment out of our meager allotment of life. Who would not contribute his mite to aid better lighting even in a small degree? An opportunity to do so by strengthening the Illuminating Engineering Society is now here. Let us avail ourselves of it.

Investigation of British Empire Hydroelectric Possibilities

Electrical and other authorities in England who are anxious to "get a move on" in connection with their projects for utilizing electrically the various water-power resources in the United Kingdom are criticising the government for its delay in announcing its national hydroelectric policy. Important schemes for which plans have been prepared are being held up temporarily. The government committees interested in the matter have been collecting material from all directions and this is doubtless responsible for the delay in giving a definite lead. A great deal of necessary work has been done which will ensure the foundations being properly laid for a safe and sane development policy to be planned and acted upon before very long.

We have referred in these pages on several occasions to the reports which have been issued relating to the utilization of water-power resources throughout the British Empire, and in view of the interest that these have excited

among our readers we may mention a recent development. In its third annual report issued in London in April the Conjoint Board of Scientific Societies refers to the work of the committee on the water power of the empire. Investigations have been stimulated in many parts as the result of its work. In India, Ceylon, British Guiana, Australia, the Union of South Africa, and the East Africa Protectorate steps are being taken by the appointment of committees or by preliminary investigation and survey to estimate the water-power supplies which will be available, and in several instances these local committees have applied to the central authority in London for guidance and assistance.

A proposal has been put forward to hold an imperial water-power conference in London during the next few months. It is felt that such a conference would focus attention on the imperial aspects of water-power developments and would be productive of good results. The inquiries received in London have led to the central body being strengthened in their already expressed opinion that some permanent central body is urgently required to co-ordinate advice and collect and distribute data relating to the waterpowers throughout the British Empire. The London conference when held will probably have this as one of its results.

Attention is being directed once more to the general lack of facilities in British universities and technical institutes for the specialized training of young men in hydroelectric engineering. It is recognized that an adequate supply of suitably trained engineers is essential to the attainment and maintenance of a suitable hydroelectric position in British engineering. To this end the committee attaches great importance to the provision of training facilities of the highest standard in this subject in one or more of the engineering schools of the United Kingdom.

Development in Lighting

Lighting devices probably have been in use since man has been endowed with human intelligence. At least specimens have been discovered in the excavations made in places on which ancient cities have stood. The museums contain many examples of candelabra and urns anciently used for lighting purposes, and history, sacred and profane, and tradition allude or refer to lighting devices or to circumstances that convince one that they were always in existence. The tradition of the Grecian sage carrying a lantern is too well known to require repetition. In fact, the word "lamp" comes directly from a Greek word with a similar spelling and meaning; the word "lantern" is derived from the Latin. It is possible, further, that systems of signal lights stationed on the promontories bordering on the Mediterranean sea and in other parts of the lands in which ancient civilizations developed were employed to transmit messages.

The remarkable feature about lighting appliances is that, in spite of their constant use by men and their important place in human affairs, they suffered no particular improvement during many centuries. If there was any change in them during the Middle Ages, the question may be asked with some seriousness as to whether or not it was not retrograde. The principles of illumination, as understood by early civilizations, consisted in constructing urns in which animal and vegetable oils could be burned in a manner that would produce light rather than heat. If historic references are reliable, one may presume that they produced considerable smoke as well as light. At any rate, no change in the principles of obtaining illumination occurred during the Middle Ages and specimens of contemporary illuminating apparatus are not more nearly artistically perfect than those designed by the Greeks and Romans.

An event, however, less spectacular than important in its relation to lighting and to human affairs, suddenly changed, or probably established, the principles of lighting. Necessarily, this event demanded a change in lighting apparatus. It was the application of the electric dynamo, only 40 years ago, to commercial enterprise. In this application American engineers have had at least an equal share. And with it the science of lighting had its inception. What this application has meant to health, comfort and industry is apparent to him who takes time to consider.

When the highway between Marseilles and Paris was lighted with oil lamps about the time of the American Revolution, men of intelligence wrote that perfection in lighting had been attained. How completely their prognostication was erroneous may be ascertained by observing the lighting equipment and effects in any American hamlet.

Progress is still the watchword of the lighting industry. To predict that even the present highly developed state of the lighting science is even near perfection is fatuous. That perfection in science is unattainable in a maxim. In fact, recent tendencies seem to indicate that the knowledge and systems of lighting of today are only rudimentary. If progress in electric lighting is to keep step with time, then the tendencies are convincing, and the illuminating science and engineer have a wonderful future.

CURRENT EVENTS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

SOCIETY FOR ELECTRICAL DEVELOPMENT HOLDS MEETING.

Plans for Coming Year Outlined—Charles L. Edgar of Boston Is Appointed Chairman of Executive Committee.

At the annual meeting of the Society for Electrical Development, held at the Engineers' Club, New York City, May 4, Charles L. Edgar, president of the Edison Electric Illuminating Co., Boston, Mass., was appointed chairman of the executive committee and announced that in the future the committee would hold bimonthly meetings for the consideration of important matters and to secure for the electrical industry the full benefit of the work the society is carrying on.

President W. W. Freeman presided at the meeting and in a short opening address told of the growth of the society and outlined its plans for future work.

General Manager J. M. Wakeman followed with his report covering the activities of the society during the past 12 months. He pointed out the fact that in spite of all handicaps the society had carried on its work, publishing the "Monthly Sales Service," and rendering more special services to its members than in any previous year. At first it was difficult to induce members to use this service, but today it is the backbone of the organization and almost every member has called for service during the past year and many, having learned how useful it is to have a staff of experts at their disposal, have shown their appreciation by calling upon them many times. Numerous members have written to the effect that some one special service rendered has more than earned their year's subscription. The use by dealers of these services, suggestions and helps benefits the manufacturer, central-station company and jobber as well as the contractor-dealer.

Mr. Wakeman also called attention to the fact that realizing that the quickest way to commercial success lies through the education of the public, particular attention had been given to this branch of the society's work. Reference was made to the international spread of the society's activities and to the close co-operation now existing between the society and the National Electric Light Association.

The following were elected directors to serve four years each: W. W. Freeman, E. W. Rockafellow, James H. McGraw, L. A. Osborne and Earnest McCleary.

At a meeting of the board of directors immediately following the annual meeting, a budget for the ensuing year was decided upon which provides for carrying on all the work of the society, publicity, advertising, the collection of statistics and data relative to the industry, the rendering of special services, publication of the "Monthly Sales Service," preparation of special articles, booklets, pamphlets and an "Electrical Christmas" campaign.

Officers for the ensuing year were named as follows: W. W. Freeman, president; Anson W. Burchard, Joseph E. Montague, Fred Bissell, James R. Strong and J. Robert Crouse, vice-presidents; J. M. Wakeman, general manager, and James Smieton, Jr., secretary-treasurer.

Mr. Edgar announced the following as members of the executive committee: Joseph E. Montague, L. P. Sawyer, W. D. Steele, E. W. Rockafellow, Fred Bissell, James R. Strong, Fred B. Adam, J. Robert Crouse, with President Freeman as a member ex-officio.

FIRE ALARM SIGNALS DISCUSSED BY N. F. P. A.

Annual Meeting at Chicago Marked by Argument Over Question of Connecting Private with Municipal Systems.

Changes and revisions made in the National Electrical Code during the past year formed the basis of the report of the Electrical Committee of the National Fire Protection Association presented at the twenty-fourth annual meeting held in Chicago, May 4-6. The report, which was brief, was presented by Chairman Dana Pierce of New York City, and was accepted without discussion.

When the report of the Signal Systems Committee was presented by Chairman Ralph Sweetland of Boston, a two-hour discussion followed, the entire time being taken up with arguments as to whether a proposed change in the constitution that would allow private fire alarm system lines to be connected with municipal fire alarm signal systems should be adopted.

The committee report was adverse to the change in the constitution. Led by A. A. Poat of San Francisco, and other Pacific Coast delegates, an effort was made to prevent the adoption of the committee report until such time as it had been changed to favor the amendment. Statements were submitted showing that in San Francisco the private lines were connected with the municipal lines and that the San Francisco fire department was well pleased with the results obtained. Statements made of experiments tried in other cities, however, brought out the fact that most of the delegates were in favor of maintaining separate central stations for the private line systems, due to the fact that private lines connected up with municipal lines had not been found to work to advantage. When a vote was taken the proposed amendment was defeated by a large majority and the committee report adopted as originally submitted.

The convention closed May 6 with the election of the following officers: W. E. Mallalieu, New

York City, president; H. O. Lacount, Boston, Mass., first vice-president; W. C. Robinson, Chicago, second vice-president; Franklin H. Wentworth, Boston, Mass., secretary-treasurer, and Rudolph P. Miller, New York City, chairman of the executive committee.

EXTRA CARS ADDED TO CONVENTION SPECIAL TRAINS.

Belated requests for information as to trains and for reservation of accommodations made to the transportation committee of the National Electric Light Association point to even a larger attendance at the Pasadena, Cal., annual convention, May 18-23, than was anticipated. Almost 3000 reservations have already been made and they are still coming in. The latest estimate made by the convention committee places the number of delegates and visitors at 3500 to 4000.

Reservations on the "Red Special" train have been so heavy that an extra car has been added to this train, which in addition to carrying visitors from the East to the convention will make an additional trip to the scenic spots of the Pacific Coast, the entire trip occupying 30 days.

It has also been found necessary to place extra cars on the "Pink Special" and the "Blue Special" trains, which will carry delegates and others attending the convention direct to the convention and back to the eastern sections of the country again.

ELECTRICAL MANUFACTURERS TO MEET IN JUNE.

General and Sectional Meetings Will Be Held in New London, Conn.—Committees of Association Announced.

A sectional meeting of the Associated Manufacturers of Electrical Supplies will be held at New London, Conn., June 26-30, according to announcements sent out by Secretary Charles E. Dustin, 30 East 42nd street, New York City. The meeting, which has been approved by the board of governors, will consist of a joint session of the 23 sections, followed by separate sectional meetings.

The names of the members of the standing and special committees of the association for 1920 have just been announced as follows:

Membership Committee.—J. H. Trumbull, chairman, Trumbull Electric Manufacturing Co., Plainville, Conn.; W. E. Barker, U. S. Rubber Co., Bristol, R. I.; Russel Dart, Alphaduct Co., Jersey City, N. J.; A. H. Englund, Electric Service Supplies Co., Philadelphia, Pa.; Edward Sawyer, Atlantic Insulated Wire & Cable Co., New York City; M. H. Sigafoos, Hazard Manufacturing Co., Wilkes-Barre, Pa.; W. E. G. Mitchell, Mitchell-Rand Manufacturing Co., New York City.

Finance Committee.—W. H. Thornley, chairman, Tubular Woven Fabric Co., Pawtucket, R. I.; Charles L. Eidlitz, Metropolitan Electric Manufacturing Co., Long Island City, N. Y.; E. B. Hatch, Johns-Pratt Co., Hartford, Conn.; B. E. Salisbury, Pass & Seymour, Inc., Solvay, N. Y.; J. E. Way, R. Thomas & Sons Co., New York City.

Law Committee.—W. H. Thornley, chairman, Tubular Woven Fabric Co., Pawtucket, R. I.; D. R. Bullen, General Electric Co., Schenectady, N. Y.; Le Roy Clark, Safety Insulated Wire & Cable Co., New York City.

Entertainment Committee.—Le Roy Clark, chairman, Safety Insulated Wire & Cable Co., New York City; Frank V. Burton, Bryant Electric Co., Bridgeport, Conn.; J. W. Perry, H. W. Johns-Manville Co., New York City; Edward Sawyer, Atlantic Insulated Wire Cable Co., New York City; Charles E. Dustin, general secretary and the president, ex-officio members.

Committee on Section Activities.—D. R. Bullen, chairman, General Electric Co., Schenectady, N. Y.; W. H. Thornley, Tubular Woven Fabric Co., Pawtucket, R. I.; Le Roy Clark, Safety Insulated Wire & Cable Co., New York City.

Committee on Nomenclature.—J. H. Trumbull, chairman, Trumbull Electric Manufacturing Co., Plainville, Conn.; John J. Gibson, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.; Shiras Morris, Hart & Hegeman Manufacturing Co., Hartford, Conn.

ARKANSAS UTILITIES ASSOCIATION DISCUSSES MANY SUBJECTS.

Thirteenth Annual Convention at Hot Springs Marked by Papers on Work of State Commissions and Operating Practice.

The thirteenth annual convention of the Arkansas Utilities Association at Hot Springs, Ark., April 26-28, was marked by an interesting address by Gov. Charles H. Brough, of Arkansas, who discussed the relations of state utility commissions with the companies and papers relating to operating practice read by men well known in the electrical industry. The association also went on record as being in favor of joining the Southwestern geographic division of the National Electric Light Association. Charles J. Griffith, general manager of the Little Rock Railway & Electric Co., was elected president of the association for the ensuing year.

The convention was opened Monday morning, April 26, by President J. S. M. Wharton, of Helena, after two hours had been given to registration of delegates and visitors. Walter Ebel, of the Hot Springs Business Men's League, welcomed the electrical men to the city, after which Mayor J. W. McClendon, of Hot Springs, introduced Governor Brough, who spoke on "Arkansas' Attitude Towards Public Utilities." It was Governor Brough who took the initiative in the legislation, which at the last session of the state legislature gave the state its first corporation commission, and he referred at some length to the advantages which would accrue to utility companies and the public alike by its rulings. The governor quoted from the annual report of the Arkansas Tax Commission to show that the utilities companies of the state had assessed themselves not only fairly but in excess of the average throughout the state. Assessments in Arkansas are made on a basis of 50% of actual value, but this percentage is not universally observed and while the properties of utilities had been assessed by themselves at the legal 50% valuation, the average in the state was only 35%. The utility companies in return should receive fair treatment and that as increased rates were necessary in order that adequate service could be given one of the duties of the corporation commission was to see that service was given for just compensation.

A. Hardgreve of Dallas, Tex., a representative of the National Electric Light Association explained by means of a chart the plan to organize a southwestern geographic division to

include Arkansas, Texas, Oklahoma, Louisiana and Mississippi, which desired to withdraw from the southeastern division and affiliate with the southwestern division. The object of these geographical divisions, Mr. Hardgreve said, was to give the various states the advantages of the work of the national association. The report favored the movement and a committee will attend the Galveston (Tex.) convention this month when the southwestern division will probably be formed.

Reports were read by W. J. Tharp, Little Rock, secretary-treasurer; on "rules and regulations" by J. A. Whitlow, Pine Bluff, and of the executive committee by Charles J. Griffith.

Tuesday morning J. L. Buchanan, president of the Wesco Supply Co., St. Louis, Mo., addressed the convention on "Lighting Protection," giving a history of the development in that line from the old time "hit or miss" methods when transformers and fuses were being continually burned out to the present methods of having arresters at every transformer, thus reducing this loss to a minimum. H. F. McRell, Westinghouse Electric & Manufacturing Co., spoke on the same subject from a different angle, with special reference to the various types of grounds in use. O. P. Barnell, also of the Westinghouse company, spoke on "Underfeed Stokers," his talk being accompanied by stereopticon views of types of stokers from the first Roney overfeed stoker in 1884 to those of the present day.

Discussion on Operating Problems.

W. G. Schmauder, Texas Power & Light Co., Dallas, Tex., talked on "Present-Day Operating Problems," with special reference to the increased, and still increasing, costs of labor, coal and material, the difficulties of raising money on utilities securities and the fixed compensation by franchises in many cases which made it difficult to obtain adequate compensation. His talk embraced many features of increased costs, urged the adoption of methods of economy and the stoppage of leaks, physical and otherwise.

"Coal vs. Oil" was the subject of a paper read by P. W. Thomas, Arkansas Light & Power Co., Pine Bluff, in which he gave the results of experiments in both fuels and also of natural gas. As to the latter he called attention to the fact that gas was the least reliable fuel because of the low pressure, and it could at best be regarded as an auxiliary fuel, it being necessary to make other fuel arrangements for use when gas was not available. Methods of handling coal and ash were discussed and Mr. Thomas cited an example of two plants side by side, using the same coal, bought at the same price, same freight and same haulage, in which the final cost of the handled coal and ash was actually several times greater in one plant than in the other, due to the methods used.

J. C. Greber, Southwestern Bell Telephone Co., Little Rock, urged as one measure of economy the joint use of poles by wire-using companies and spoke of the waste in having duplicate poles on city streets and country roads when half the cost could be conserved by joint use agreements.

At the final session of the convention on Wednesday, Thomas E. Wood, member of the Arkansas Corporation Commission, Little Rock, addressed the convention, going into detail as to the duties of the commission both toward the public and all utilities, the necessity for fair and just rates and at the same time the righteous demand of the public for adequate service. He especially deplored the attacks made on the commission by politicians and candidates who sought unjustly to align the commission with politics, the original attack having been made by a town in the state which thought it should be granted certain rights which the commission had the best of reasons to refuse in the interests of the public.

A resolution was adopted inviting the National Electric Light Association to hold its 1921 convention at Hot Springs.

The association elected the following officers: Charles J. Griffith, Little Rock Railway & Light Co., president; J. F. Christy, Jonesboro Municipal Light & Power Co., first vice-president; J. A. Whitlow, the Pine Bluff Co., second vice-president; R. M. Foster, Helena Gas & Electric Co., third vice-president, and S. E. Dillon, Hot Springs, secretary and treasurer.

UTILITY HEADS DISCUSS FINANCIAL STRAITS OF COMPANIES.

Situation Is Reviewed at Hearing Before Illinois Public Utility Commission in Which Banking Interests Are Represented.

A dismal view of the financial outlook of public utility companies operating in Chicago and Northern Illinois was painted by presidents and other officials of the various utility companies and by representatives of Chicago banking institutions at a special hearing held by the Illinois Public Utility Commission in Chicago, April 29, in an effort to devise means of helping the utility companies out of their present financial difficulties.

Among those present at the hearing, beside the full membership of the commission, were Samuel Insull, president of the Commonwealth Edison Co., the Public Service Co. of Northern Illinois, and the Peoples Gas Light & Coke Co.; B. E. Sunny, president of the Chicago Telephone Co.; Henry A. Blair, president of the Chicago Surface Lines; Charles G. Dawes, president of the Central Trust Co.; E. D. Hulbert, president of the Merchants Loan & Trust Co., the Illinois Trust & Savings Bank and the Corn Exchange National Bank; Chester Corey, vice-president of the Harris Trust & Savings bank; David R. Forgan, president of the National City bank, and others representing banking interests and bond investment companies.

According to figures submitted by the various utility heads there is urgent need at the present time of $100,000,000 for improvements and extensions that must be made if the utilities are to be kept at a stage of efficiency desired by both the companies and the public. This amount is divided as follows: electric companies, $20,000,000; telephone company, $20,000,000; gas companies, $25,000,000; surface lines, $25,000,000, and elevated roads, $10,000,000.

Mr. Insull, speaking for the electric light com-

panies, gas company and elevated railroads, said that the situation was a serious one and that a breakdown in utility service of all kinds threatened unless steps were taken for immediate relief.

In presenting his appeal to the commission, Mr. Insull said: "The Commonwealth Edison Co. has never passed a dividend. For a long time we have sought no increase in rates. And yet our 5% bonds instead of being at par, or above, are selling at $81. Through the war all of the utilities operated at a minimum expense. Now enormous expenditures are required to meet even the normal demand. The Commonwealth Edison Co. with the best of luck can squeeze through next winter. We require $10,000,000 to put us where we belong right now. We must have $5,000,000 this year and $5,000,000 next year to get through 1921."

In regard to the Peoples Gas Light & Coke Co., which now has an appeal for an increase in its rates from 85 cents to $1.25 per 1000 ft. before the commission, Mr. Insull said the company was losing money at the rate of $8500 a day in its present operations and that it was impossible to get any money from any source. He declared the elevated railway lines could not get money at any price, and that they are carrying $12,000,000 in overdue notes without paying interest.

Speaking for the telephone company, Mr. Sunny told the commissioners the company was in a desperate plight not only financially but from the point of view of the service it is able to furnish the public. "We should be given free rein in the matter of rates to save a calamity," he said. "To bring the service of the company up to the standard necessary at the present time we should have $20,000,000. Half of that sum we should have at once.

"The war prevented the expenditure of $3,000,000 in 1917 and 1918. It also caused an excessive demand for service. The high cost of money has prevented our taking the first step toward betterment of service. The telephone securities are of the best, but they are selling at 90. I do not believe this is due to prejudice on the part of the public. They have been frightened out of the market by the fear that the companies will not be permitted to earn sufficient money to take care of their indebtedness."

Speaking on the banking side of the situation, Mr. Dawes brought the political question into the hearing when he said: "The utilities of Chicago are without credit largely because they are known to be a football in politics and questions involving them are not handled in the interests of the people, as it should be. This has a tendency to incur the distrust of the investing public. Investors say, 'we don't want to buy into a political wrangle.' If stability is to be established demagogic attacks must cease. The trouble today is that we do not have arguments on these considerations that are fair. The public pays the cost in impaired service. We've got to the point where it has got to be municipal ownership or capital has got to come to the relief of these enterprises, and municipal ownership would be a failure even before it started."

Mr. Forgan, of the National City bank, said it was impossible for any utility company to borrow money for less than 8% and that the country had never seen such a heavy demand for credits and that banks were expanded to the limit, although during the war the limit was never reached.

Mr. Corey pointed out that in the four weeks beginning March 22 notes and bonds of utilities and industrial companies aggregating $245,890,000 had been issued at an average yield to the investor of 7½%. "That money," he said, "cost the borrowing corporation an average of 8½%."

In speaking of the prevailing rates of interest, Mr. Insull said he would consider 8% money cheap for the Commonwealth Edison Co., while 10% would be cheap for the Peoples Gas Light & Coke Co., but that money even at those rates was unobtainable.

OFFICERS FOR 1920 ARE NAMED BY AMERICAN WELDING SOCIETY.

Following the technical session of the American Welding Society in New York City, April 22, a report of which was given in the last issue of ELECTRICAL REVIEW, the business meeting and election of officers was held. The new officers elected are: President, J. H. Deppeler, Metal & Thermit Corp.; vice-president, (two-year term), J. W. Owens, Norfolk Navy Yard; vice-president, (one-year term), D. B. Rushmore, General Electric Co.; directors, (three-year term), W. M. Baird, Linde Air Products Co.; A. M. Candy, Westinghouse Electric & Manufacturing Co.; C. J. Halsey, Electric Arc Cutting & Welding Co.; W. J. Jones, consulting engineer; C. A. McCune, Page Steel & Wire Co.; S. W. Miller, Rochester Welding Works; Joah Bragden, David Lipton Sons Co., and P. F. Willis, Henderson-Willis Welding & Cutting Co.

MANUFACTURERS' COUNCIL MAKES RECOMMENDATIONS ON SHOWS.

Committee Seeks to Encourage a High Standard in Electrical Shows and to Stimulate Exhibitors in Making Displays.

With the interest on the part of manufacturers, contractor-dealers and the general public in electrical shows growing rapidly the recommendations of a committee appointed by the Electrical Manufacturers' Council at the request of the Electric Power Club to consider the scope and possibilities of such shows are pertinent and timely.

The report of the committee, with a few slight changes, was adopted by the council, and forms the basis of recommendations in connection with future shows that are now being sent out to all parties interested.

Briefly stated the recommendations made by the council are as follows: Exhibitors shall have representation in the management of the show equal to that of the local management. Class and nature of exhibits shall be determined by the management. Concessions for sale of knicknacks, toys and candy are to be prohibited.

Souvenirs are also to be prohibited as they represent waste and extravagance of a character

which the industry is trying to prevent. Exhibitors shall not be asked to give financial support through advertisements in programs or catalogs.

Passes are to be issued to officers, official representatives and attendants of exhibiting companies and such exhibitors may have trade tickets at one-half the regular admission price.

The recommendations further provide that the show management shall strive to make the character of the exhibit such as will reflect credit upon the electrical industry and at the same time keep the expense within reasonable limits. Any surplus after payment of legitimate expenses shall be returned to the exhibitors in proportion to the amount of space used.

For the amount paid for space the show management will provide the following service to exhibitors: Insurance against theft and fire; watchmen day and night; clean aisles and thoroughfares (not including exhibits); store boxes and other containers in good order and at the proper time deliver them promptly to exhibitors for return shipment.

The last recommendation is to the effect that, before contracting for space or otherwise committing themselves to participate in an electric show, all electrical manufacturers ascertain from the secretary of the Electrical Manufacturers' Council if the management of the show has adopted the recommendations of the council. Frederic Nicholas, Bronxville, N. Y., is secretary of the council.

RADIO ENGINEERS DISCUSS PAPERS OF NAVAL EXPERT.

Two papers by Dr. Louis W. Austin, head of the United States Naval Radio Telegraphic Laboratory, were presented at the May meeting of the Institute of Radio Engineers, held in New York City, May 5. The subject of Dr. Austin's papers were "The Relations Between Atmospheric Disturbances and Wave Length in Radio Reception" and "Quantitative Experiments With Coil Antennas in Radio Telegraphy."

POWER-FACTOR IS DISCUSSED BY PENNSYLVANIA ASSOCIATION.

Discussion of questions concerning power-factor was the chief topic taken up at the meeting of the Western Geographic Division of the Pennsylvania Electric Association, held at the William Penn Hotel, Pittsburgh, Pa., April 21, with 200 members in attendance.

In presenting a paper on "Power-Factor and Kilovolt-Ampere Measurements," W. H. Pratt outlined the various conditions under which power-factor and kv-a. must be measured, and described the methods of making these measurements. Most of the methods in use are satisfactory, the most serious of the problems being due to wave-form distortion.

A. M. Lynn, president of the West Penn Power Co., pointed out that power companies could sell more power today than they could finance the necessary extensions for and that one of the most difficult problems in the operation of utilities had become that of finance. Papers were also read on "Analysis of Power-Factor Conditions on a Large Central-Station System," by C. L. Rupert, and "Power-Factor Correction," by Robert Treat. A paper on "Induction and Synchronous Motors for Industrial Applications," presented by C. W. Drake, is printed elsewhere in this issue.

SEATTLE SECTION, A. I. E. E., HEARS PAPERS BY MUNICIPAL MEN.

Seattle Section of the American Institute of Electrical Engineers held its monthly meeting at the Arctic Club, April 20, with 80 members, five enrolled students and 10 visitors present.

Three papers were presented by men from the Seattle municipal light and power system. R. F. Nicholson discussed "New Features of the Cedar Falls Pipe Line," giving a history of the selection of the final location and describing various features in connection with the design and construction of the line. W. J. McKeen's paper was on "New Features of Power House Design," and Glen H. Smith spoke on "A New Plan of Distribution" which has been adopted by the department. This plan consists of running 26,000-volt, three-wire, three-phase, Y-connected, No. 2 copper lines to centers of distribution where outdoor type transformers step the voltage down for 2500-volt feeders, running in four directions from this center.

COMING CONVENTIONS.

American Association of Engineers. Annual convention, St. Louis, Mo., May 10 and 11. Headquarters, Planters Hotel. Secretary, C. E. Drayer, 63 East Adams street, Chicago.

Electrical Supply Jobbers' Association. Annual convention, Del Monte, Cal., May 12-14. Franklin Overbagh, general secretary, 411 South Clinton street, Chicago, Ill.

Southwestern Electrical and Gas Association. Annual convention, Galveston, Tex., May 13-15. Headquarters, Hotel Galvez.

National Electric Light Association. Annual convention, Pasadena, Cal., May 18-21. Headquarters, Hotel Huntington. Acting secretary, S. A. Sewall, 29 West 29th street, New York City.

Missouri Association of Public Utilities. Annual convention, Jefferson City, Mo., June 3-5. Secretary, F. D. Beardslee, St. Louis, Mo.

North Central Geographical Division of National Electric Light Association. Annual convention, Minneapolis, Minn., June 16-17. Headquarters, Radisson Hotel. M. Barnett, Northern States Power Co., St. Paul, Minn., secretary.

Iowa Section, National Electric Light Association. Annual convention, Colfax, Ia., June 23-25. Rex H. Clark, assistant secretary, Des Moines, Ia.

American Institute of Electrical Engineers. Annual convention, White Sulphur Springs, W. Va., June 29-July 2. Headquarters, The Greenbrier, F. L. Hutchinson, secretary, 33 West 39th street, New York City.

Ohio Electric Light Association. Annual convention, Cedar Point, Ohio, July 13-16. Secretary, D. L. Gaskill, Greenville, O.

Pacific Coast Section, American Institute of Electrical Engineers. Annual convention, Portland, Ore., July 21-23.

Michigan Section, National Electric Light Association. Annual convention, Ottawa Beach, Mich., Aug. 24-26. Headquarters, Hotel Ottawa. Herbert Silvester, secretary-treasurer, Ann Arbor, Mich.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

VALUE OF MISCELLANEOUS MOTOR APPLICATIONS ON FARMS.

An interesting report on the value of miscellaneous motor applications for use on farms was given at a recent meeting of the commercial section committee of the New England section of the National Electric Light Association. The report shows the possibilities of large revenue from this source if the central-station companies seek the business and get the farmers interested.

In the report figures from three farms, each 10 to 20 mi. from the main generating station of the supply company, were given. The first farm has 7½ hp. in motors for use in feed grinder, saw and milking machine. The motor brought in an income of $110.46 in a year's time to the central-station company, the monthly bills ranging from $7.50 to $12.50.

The second farm has 15 hp. installed for ensilage cutting, milking machine, small motors for separators, etc. The power bills for a year totalled $150.78. The third rural customer has 19½ hp. for pumping water, sawing, ensilage cutting, milking machine, etc., and had a total power bill for 12 months of $359.27.

The central-station power man may not have time to seek these loads, but on his lines in rural communities there are latent possibilities. Co-operation with the farm bureaus in the different districts will help educate the farmer to the possibility of electrical energy making his work easier, this being especially true in thickly settled localities like New England where the central-station companies in most instances have transmission lines in such close proximity to the house and barn of the farmer that the cost of line extension to get the new load will be at a minimum.

NEW JERSEY COMMISSION RULES ON USE OF PATENT APPLIANCE.

In a complaint case brought against the New York Telephone Co. by the Quick Action Collection Co., Newark, N. J., the New Jersey Board of Utility Commissioners upholds the rule of the telephone company limiting the use of apparatus to that furnished by the company.

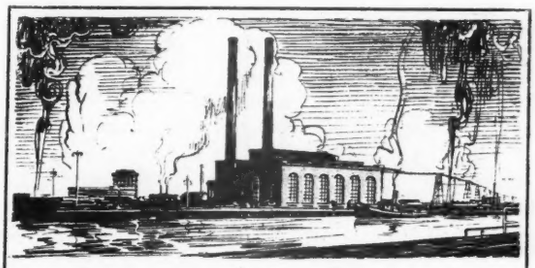
The controversy between the company and the collection agency resulted from the use by the latter of a patented appliance whereby it was made possible for a person using the telephone to make use of both hands in holding manuscript, writing or otherwise. This device necessitated the removal of parts of the apparatus provided by the telephone company and the substitution of other parts. It was held by the telephone company that, in addition to being a violation of its rules, the device installed impeded the telephone service. The collection agency, on the other hand, held that the regulation of the company against the use of apparatus other than its own was unreasonable.

In supporting the rule of the telephone company, the commission said that it has generally been conceded that utility corporations have a right to adopt and enforce reasonable rules and regulations, and giving full consideration to the factors in the case, it was held that this rule was obviously a reasonable and proper one.

SALE OF STOCK BY EMPLOYES OF COMPANY A SUCCESS.

Nearly 20,000 shares of preferred stock of the Public Service Co. of Northern Illinois have been sold in a campaign, the purpose of which is to market the stock of the company to its customers and small investors in the communities served by the company.

The campaign has attracted attention throughout the country and has stimulated other public utility companies to inaugurate the same sort of a sale, that is, one in which its employes act as



The 1920 Census—and Investments

THE 1920 United States Census returns show an amazing increase in the population of cities and towns during the last ten years. Yet this growth, great as it is, is eclipsed by the growth in the same period of Central Stations supplying these communities with electricity for light, heat and power.

Today there are over 3,000 uses for electricity, many of which continue to increase in popularity every day. Constant increase in population of cities and towns and ever-increasing demand for electricity assure the future growth of electric service companies. Electric service is as essential to the life of a city as air is to the citizen.

An investment in a well managed power company, therefore, carries with it a degree of safety approached by few other industries.

You now have the privilege of purchasing 6% cumulative preferred stock in the Public Service Company of Northern Illinois on deferred payments

Investment Department

Public Service Company
of Northern Illinois

Advertisement Used to Stimulate Sale of Preferred Stock of Public Service Co. of Northern Illinois.

the selling force. It has also been commented upon in technical papers and will be made the subject of discussion at the National Electric Light Association convention.

One surprising feature brought out in the campaign is the ability of employes, trained in other kinds of work, to turn stock sellers and induce purchasers to invest in the utility company serving the district in which they reside.

PENNSYLVANIA COMMISSION MAKES IMPORTANT RULING.

Refuses to Allow Incorporation of Electric Company Where Granting of Right Would Result in Competition.

The Public Service Commission of Pennsylvania in a recent decision refused to approve the incorporation of an electric company on the ground that such approval would result in competition, basing its ruling on the statement that competition in public service with its attendant evil of duplication of plant investment, the burden of which utilmately falls upon the rate payers, is to be avoided.

The ruling was made in the application of the Glen Mills Electric Co., which was formed for the purpose of supplying light, heat and power to the township of Thornbury, Pa., where the Thornbury Township Electric Co. had been under limited operation since 1916.

The decision in full follows:

"This is an application for the issuance of a certificate of public convenience evidencing the commission's approval of a charter and the beginning of the exercise of rights thereunder, in a territory for which another and protesting company has secured such rights.

"The Thornbury Township Electric Co. was incorporated in February, 1915, and obtained a certificate of public convenience to render electric service in Thornbury township, Delaware county. This corporation and its rights were in due form of law by merger, with the approval of the commission, incorporated into the Delaware County Electric Co. in August, 1916.

"With the exception of stringing a few short spans of wire, entirely disconnected from any electric circuits, the Delaware County Electric Co. apparently made no serious attempt to exercise its acquired rights or to render to the public the service which under the charter of its constituent company, the Thornbury Township Electric Co., it was obligated to perform, until about the period the Glen Mills Electric Co. presented the pending application for approval of its charter.

"In other words, the Thornbury Township Electric Co. or the Delaware County Electric Co. has permitted a period of over four years to elapse without making any substantial efforts to function in public service in the territory in question. The testimony discloses that not until notice that a competing company was prepared to enter the field did the protestant company take on activity to comply with its public obligations. Such a situation, under anything like normal or usual circumstances, should not and could not be tolerated. It would be the plain duty of this commission to grant public relief, either by giving another company the right to enter into the territory competitively, or by compelling the recreant company by appropriate order to extend its service.

"Certificates of public convenience are not granted by this commission in order that legal rights may be acquired by corporate interests and then held for the purpose of exploitation or development at a later period. Certificates are granted only if and when public convenience or necessity is shown to demand their issuance. When issued, it follows as a matter of good faith and legal obligation that immediate efforts should be put forth to care for the public requirements. If such obligations are not fulfilled, it follows that the commission may, in a proper case, permit the territory to be served by a competing company.

"In this case the Delaware County Electric Co., apart from general disavowal of neglect in the exercise of its rights, sets up the claim that it was prevented by war conditions and the demands upon its equipment for war work from extending its service into Thornbury township. There is sufficient in the testimony to lead the commission, if not to absolve the protestant entirely, at least to give it the benefit of the doubt and to afford it a further opportunity to exercise its rights, now that war priority demands no longer prevail. In so concluding, we are placing emphasis upon the fact that the noncompetitive rule is one that ought not to be lightly set aside, because it is a rule of regulatory policy inuring to the benefit of the public and the utility. Competition in public service, with its attendant evils of duplication of plant investment, the burden of which ultimately falls upon the rate payers, is, of course, to be avoided.

"In the circumstances the commission is unable to find, upon a consideration of all the evidence that the approval of the pending application is necessary or proper for the service, accommodation, convenience or safety of the public, and it is therefore refused."

EDISON CLUB OF CHICAGO HOLDS ANNUAL ELECTION.

William A. Durgin was re-elected president of the Edison Club, the employes' organization of the Commonwealth Edison Co., Chicago, at the recent annual election. A. B. Gates was elected vice-president and F. E. Ashton, Jr., secretary. The club, which is now a year old, has 3330 members. Tyler G. Price and Miss Margaret Maclennan, winners of the first and second prizes, respectively, in the recent prize paper writing contest on "Co-operation," held by the club, will attend the coming convention of the National Electric Light Association at Pasadena, Cal., as the guests of the club.

COMPANY GENERATES 47% OF OUTPUT BY WATER POWER.

During the year 1919 the electric subsidiaries of the Standard Gas & Electric Co. had a total output of 770,857,955 kw-hrs., an increase of 11.5% over the preceding year. Of this total output 362,528,688 kw-hrs. were generated by water power.

CONTRACTOR-DEALER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-keeping for the Dealer in Electrical Goods

AN ARGUMENT FOR GOOD WINDOW DISPLAYS.

The Story of One Electrical Dealer Who Appreciates Their Value, and Another Who Had to Learn the Lesson.

The number of clean and well-kept electrical appliance stores that are coming into existence in cities, both large and small, especially in the residential districts, demonstrates that dealers who have been in the industry and those just

An Electrical Attraction for "Window Shoppers."

entering it have had their ears to the ground and realize that in the majority of cases it is women that form the majority of their customers and that a clean, bright store with a neat show window appeals to them in the same way that it does in any other mercantile establishment.

Women admit, in most cases, that they are "window shoppers" and it is the window with the neatest and best looking display of goods that draws them inside and makes customers of them. A case in point can be cited in a middle west city of about 45,000 inhabitants. For a number of years one store had practically a monopoly of the electrical appliance business in the city. The proprietor was a young man, not old enough to have become set in his ways, but he could not appreciate the value of "wasting time," as he put it, in making his window displays look attractive.

Along came another man and he opened an electric shop, not on the main street, as the first man's was, but on a side street. He did not fit up the interior of his store any better than that of his older rival, but the newcomer did believe in snappy, neat and attractive window displays, usually with some novel effect in the way of an application of an electrical device.

What was the result? In just 14 months' time the newcomer had taken away so much business from his older rival that the stores were consolidated and the stock moved to the "little store around the corner where there was always something new in the window."

CENTRAL STATION USES PAPERS IN DEALER CO-OPERATION.

Public Is Directed to Nearest Electrical Store by Advertisements of Lighting Company in Household Appliance Campaign.

Herewith is reproduced a copy of one of a series of advertisements now being used in the daily newspapers in Chicago by the Commonwealth Edison Co. This series of advertisements is a part of the company's plan of co-operation with the Associated Electrical Dealers of Chicago in the sale of household appliances on the time-payment plan.

The copy of the advertisement is simple and direct, as well as eye-catching. The line-drawing of a woman in the midst of her ironing with an electric flatiron, tied up with the catchy "One Dollar Down" announcement, is intended to attract the attention of every housewife who reads the paper.

Sample of Advertisement Used by Commonwealth Edison Co. in Dealer Campaign.

Business Hints for the Dealer

Teaching Purchasers to Sell Goods—Landing Difficult Orders—Practical Information Versus Rate Cutting in Making of Sales

There is in one of our large cities a man selling domestic laundry equipment whose success has depended upon his ability to persuade his customers to sell goods for him. Of course he does not tell these customers that he is trying to get them to act as salesmen for him. He has accomplished his purpose by just reversing the usual order of selling goods.

This dealer does his order taking over the telephone. Rarely does a salesman call upon a prospective customer until the sale has been made. After the sale has been made, however, his real selling work begins. Then the equipment that has been purchased is thoroughly demonstrated to the customer and to those who will be required to use it. No effort is spared to give the instructions and information which will result in making the customer not only satisfied but enthusiastic.

Since all the personal attention the customer receives is after, rather than before, the sale is made, it is not difficult to create enthusiasm among the purchasers. Other firms from whom they buy frequently desert them as soon as the money is paid over, and this attention after the sale is made and the money collected never fails to arouse more or less substantial enthusiasm on the part of buyers.

Unconsciously, these purchasers become good salesmen for this dealer. They tell their friends and neighbors about the wonderful service they have received; they repeat the arguments in favor of this particular appliance which the demonstrating salesman has given them, and before they realize it they have persuaded their friends to buy, and to buy from this particular electrical dealer.

This dealer does not call his post-purchase efforts sales work; he does not consider it in the light of instructions to the purchasers in making sales. He calls it service, but his service is so much different from that which people have been in the habit of expecting that it makes his customers good sales people for him. It teaches them unconsciously how to sell his goods for him.

Landing the Difficult Prospect.

A new salesman was sent to sell electric power to a certain customer. When he returned to the office he exhibited an advertising souvenir which the prospect had given him. The sales manager said to him: "I sent you out to get a contract, not to collect souvenirs." To this the new salesman replied: "I did get the contract and he was so pleased with our proposition that he gave me one of these."

That prospect had a reputation of being particularly hard to deal with. Every old salesman on the force had tried to interest him and each had failed. The sales manager did not believe the new salesman could secure an order when he sent him out on the call. It was merely an experiment. As a result, he was very surprised to see the contract. In fact, he at first refused to believe his eyes, but verification was obtained by telephone.

When questioned as to his experience the new salesman manifested no evidence of difficulty in securing the contract. He had gained the impression that this man he had visited was a good prospect. He was the only man to make that particular call who had not heard that it was next to impossible to secure the attention of this prospect. Being ignorant of the difficulties supposed to surround the selling of electric power to his prospective customer, the salesman went ahead on the presumption that it would be a mere matter of detail to get the contract signed, and he closed the deal and secured the signature before he learned that he had accomplished something unusual. In his blissful ignorance he had given no thought to possible difficulties.

In every territory there are some prospective customers around whom the sales force has built up a reputation of being extremely difficult to sell. Because of this reputation they fail to make sales to such people despite the fact that it would be quite an easy matter if they could forget for a moment this artificial reputation. Thus does such a sale await the attempt of a stranger who has never heard of this reputation.

This particular dealer is convinced that the only way some sales can be made is to be entirely ignorant of the difficulties in the way. The more conversant a salesman is with the possible trials he may encounter, and the more there runs through his mind the thoughts of possible failure, the fewer chances that he will succeed in making a sale even though the prospect really wants the goods.

In selling, the sort of ignorance that is bliss—the sort that increases the size of the pay check—is ignorance of the alleged difficulties that stand in the way of a sale, according to the practices of this dealer. He calls attention to the American soldiers in France who, had they had knowledge of the difficulties that confronted them, could not have accomplished as much as they did in so short a time. Being ignorant of these obstacles they plunged right in, accomplished the seemingly impossible and did not realize what they had done until the whole thing was over. In the same way, some green salesmen who are blissfully ignorant of difficulties that stand in their way, may make sales that the older men have given up as hopeless.

Practical Information vs. Rate Cutting in the Making of Sales.

Many contractors and dealers insist that prices never make sales; they may close orders but never make sales; someone must really make the sale by creating in the mind of the prospect a desire for the goods before they can be sold by cutting prices. People then buy the cut-rate

substitute for the goods they have been sold but which they felt they could not afford to buy.

Harping on prices is not going to build sales, one dealer declares; it may easily prevent sales. He asserts that falsehoods are more often connected with low prices than with high prices. One reason why people are willing to pay higher prices for goods is because higher prices usually go with absolute honesty. Also, with the higher prices usually goes service in the way of intelligent, trustworthy information. People will continue to buy electrical appliances at electric stores because they there learn how good such appliances are and how much more economically they can be used, while at the cut-rate store they learn only how cheaply they may be sold.

Practical information that tells the customer all about the goods is what sells them so that they stay sold. In fact, this is the best kind of information with which to build up sales. The reason the public is using so many things today that were never used before is because of having received practical information about them.

Time Payment and Family Budgets.

Recently a salesman was heard to remark about a prospective customer: "Oh, those people can't afford to buy this appliance." He was accused by his employer of trying to make up a budget for this family in which his own goods were omitted.

The salesman was instructed by the dealer to attempt to have this family's budget arranged so there would be a regular expenditure allowed for electrical appliances. He was told that one of the greatest advantages of selling electrical appliances on easy terms is, that it gets the people into the habit of including in their budget of expenses a certain sum to be paid out regularly for electrical appliances.

After the first appliance was paid for, the dealer concluded there was no reason why an attempt should not be made to continue the practice of collecting an equal amount from these people each month. His experience was that sometimes this can be done by selling another expensive appliance on time; at other times the result can be accomplished by selling smaller articles each month. The point was to bring these articles to the customer's attention each month, and to feature strongly the same sum that had been paid during the past months.

The amount of money many people have at their command to spend is limited. All of this money is used for some purpose each month. Just as soon as they have more than enough money to buy the barest necessities of life they are going to spend the remainder in ways they believe will give him the greatest returns. There is no reason in the mind of this dealer why a part of this money should not be spent for electrical appliances.

KEEPING TRACK OF OLD CUSTOMERS.

In his files one dealer keeps the name of each customer, the address, telephone number, data as to purchases, date of each purchase and remarks on the possibility of future sales. At convenient intervals—perhaps once a month—he calls the customer on the telephone and asks, for instance, how she is getting along with the washing machine, or the sewing machine, or the electric iron, or whatever the appliance happens to be. He invites complaint or any other opening that will permit keeping in touch with the customer with a view not only to maintaining satisfaction but to the introduction of other appliances or jobs of wiring or placing of outlets.

Where this plan has been carried out, even in a haphazard manner, the results have more than repaid the service overhead involved. And the customer has nearly always shown appreciation by verbal advertising of the dealer among his or her neighbors.

SHOWCASE LIGHTING FOR GOODS IN AN ELECTRICAL STORE.

Independent Lighting of Interior Display Cases Proves to Be Profitable Form of Advertising and Merchandising.

No matter how many and varied the articles may be in a showcase, if they are lighted so that every detail may be plainly seen more goods will be sold from that showcase than from others that depend upon the general lighting of the store to disclose their contents. And independent lighting for a showcase costs very little.

No matter how well lighted a store may be, nothing brings out so distinctly the individual articles in the showcase as the localized lights whose direct glare is concealed from the customer. Minute examination of each article is thus afforded and the goods are more than half sold before the clerk reaches the customer.

Illumination That Helps Sell Electrical Goods from the Showcase.

In the showcase here illustrated there are six lamps, three for each shelf, all shielded from the eyes of the customer by angle reflectors that direct the rays of the lamps over and about every article in the case.

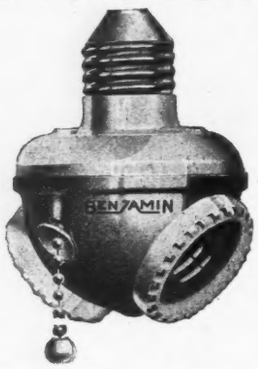
In the same store where this case is located the dealer had for a time another showcase on the opposite side of the store with practically the same fixtures displayed, but without independent lighting. This was done as a test, and accurate account of all sales from each case was kept separately. The illuminated case showed an average of 60% more sales than the other case.

NEW APPLIANCES

Newly Developed and Improved Electrical and Mechanical Apparatus, Appliances, and Devices Now Being Placed on the Market

Two-Way Plug with Pull Chain on One Outlet.

A two-way plug with one outlet controlled by a pull-chain switch is being marketed by the Benjamin Electric Manufacturing Co., Chicago, Ill. This

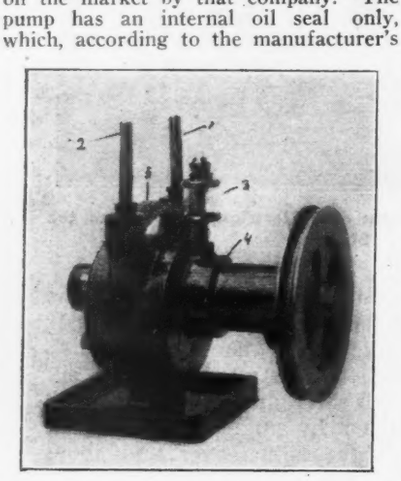


Two-Way Benjamin Plug with Pull Chain.

plug is a development of the two-way plug manufactured, without the switch, by this company. This plug can be used to operate a lamp and a device from a single existing outlet and to control the lamp independent of the device.

Pump for Exhausting Lamps and Bulbs to High Vacuum.

A high-vacuum pump, developed by the Newark Engineering & Tool Co., Newark, N. J., has recently been put on the market by that company. The pump has an internal oil seal only, which, according to the manufacturer's



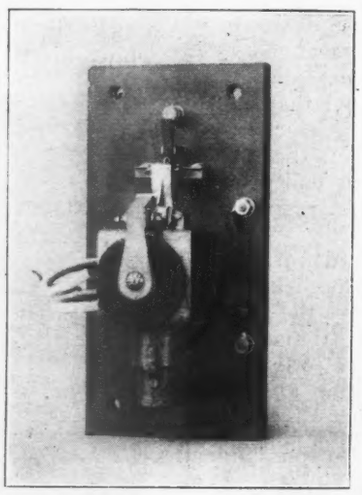
High- Vacuum Pump With Internal Oil Seal.

claims, saves from 80 to 90% of the oil usually required by such pumps. This pump is designed for use in the manufacture of incandescent lamps, X-ray bulbs, etc., and can be used with vacuum furnaces, in scientific research work and in other places where high vacuum is required. A 0.25-hp. motor is required to operate the pump which is intended to run at 275 to 300 r.p.m. The driving pulley is 7.5 ins. in diameter, and is machined for a round belt.

Relay for Trip Circuits.

The type KN relay now being made by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., may be used either as a signal relay or a trip-free relay. As a signal relay it operates an audible or visible signal to notify the attendant that a circuit-breaker has been tripped automatically. The trip-free relay, according to the manufacturers' claims, prevents holding in an electrically operated device such as a circuit-breaker while an abnormal condition exists on the circuit.

The signal relay is intended for d-c. service only, though it may be supplied for a-c. operation. The standard voltage coil may be used on control circuits of 100 to 250 volts. For voltages be-



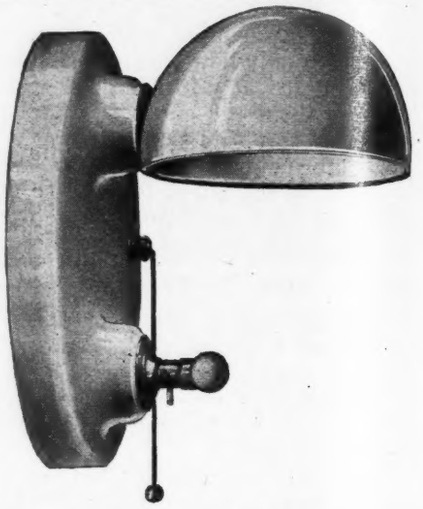
Relay for Use on Trip Circuits.

low this a special coil must be used, while for higher voltages a resistor must be inserted in series with the coil. The latch-release coil is rated in accordance with the current required by standard trip coils, and relays can be supplied for ½, 1 and 3 amperes.

The signal relay has its main coil wound for voltage operation and its release coil wound for current operation. All coils are designed for momentary operation only, and are so connected that they are in the circuit only for the time required by the operation of the apparatus.

Fixture With Auxiliary Night Light.

Luminous Unit Co., St. Louis, Mo., is marketing a "night lite" for use on a-c. circuits of 110 volts. The auxiliary light is supplied by a six-volt, 2-cp. automobile lamp. A transformer in the fixture-base provides the reduced voltage to operate the small lamp. This fixture is one of the line manufactured by this company under the trade name

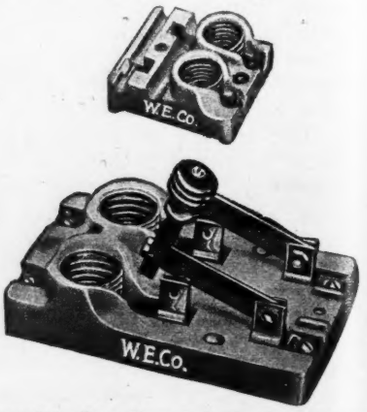


"Night Lite" With Auxiliary Transformer Concealed in Base.

of "Aglite." They have all exposed parts made of white glass and are recommended by the maker for use in hospitals and bathrooms, the claim being made that the finish is permanent and can be cleaned easily.

Two-Pole Entrance Switch and Single-Branch Cutout.

Ward Electric Co., Philadelphia, Pa., has placed on the market a two-pole porcelain-base entrance switch and a



Porcelain-Base Two-Pole Entrance Switch and Single-Branch Cutout.

two-wire single-branch cutout. The cutout and switch are assembled on white porcelain bases and have substantial current-carrying parts. These devices are packed in individual cartons and are designated by standard numbers.

LATEST APPROVED APPLIANCES

Approved by Underwriters' Laboratories, Following Examination and Tests Conducted Under the Standards of the National Electrical Code

Conduit Boxes.—The N. E. Henderson Co., 1320 Race street, Philadelphia.

"Circle H." type A and B, castiron conduit boxes for use with rigid conduit.

Listed March 12, 1920.

Cutout Bases, Plug Fuse.—General Electric Co., Schenectady, N. Y.

G. E. plug fuse cutout bases; 0-30 amperes, 125 volts; catalog No. 179796.

Listed March 1, 1920.

Fuses, Plug.—Trenton Electric & Conduit Co., Trenton, N. J.

"Fecco" plug fuses; 0-10 amperes, 125 volts.

Listed March 16, 1920.

Ground Clamps.—Blackburn Specialty Co., Perkins avenue and 35th street, Cleveland, O.

"Blackburn" Ground clamps for use with rigid conduit; for 1¼-in. conduit or less, catalog No. 5; for 3-in. conduit or less, catalog No. 6; for use on signaling system only; "Blackburn" catalog Nos. 1, 2 and A-1.

Listed March 9, 1920.

Heaters, Air.—Edison Electric Appliance Co., Inc., 5660 West Taylor street, Chicago.

"Sunray" luminous air heaters; 600 watts, 95-250 volts; catalog Nos. 316, A10.

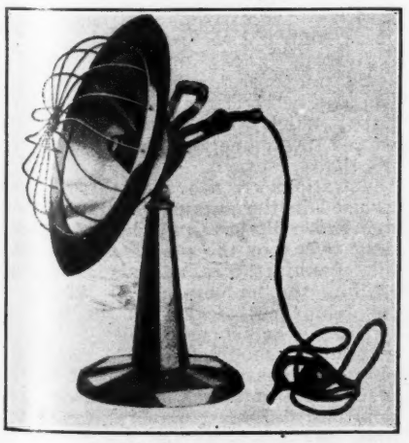
Listed March 17, 1920.

Heaters, Air.—Edison Electric Appliance Co., Inc., 5660 West Taylor street, Chicago.

"Hotpoint" luminous air heater; 600 watts, 95-250 volts; "Hedlite" catalog Nos. 116, A10.

Listed March 16, 1920.

Heaters, Air.—Estate Stove Co., Hamilton, O.



"Estate Sunburst Heater;" 110 volts, 5.5 amperes; catalog No. 94.

Listed March 16, 1920.

Heaters, Air.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Westinghouse" portable automobile engine heater with cord and separable attachment plug for use in preventing freezing of automobile radiators and engines; 100 watts, 110-120 volts; style No. 283395A.

Listed March 5, 1920.

Lamp Adjusters.—Anderson Electric & Equipment Co., 118 South Clinton street, Chicago.

"Reelite" lamp adjuster; an automatic reel with portable, flexible cord and socket, for pendent use only; 250 watts, 250 volts; catalog No. 1533.

Listed March 16, 1920.

Receptacles for Attachment Plugs and Plugs.—Central Electric Co., 320 South Wells street, Chicago.

"Ralco" receptacles for attachment plugs and plugs; 225 amperes, 250 volts; catalog No. 41.

Listed March 17, 1920.

Receptacles for Attachment Plugs and Plugs.—W. F. Hessell Co., 114 Liberty street, New York.

"Portostrip" single plug receptacle in steel wall case with wooden plug; 6 amperes, 250 volts.

Listed March 16, 1920.

Receptacles, Medium Base.—Pass & Seymour, Inc., Solvay, N. Y.

"P. & S." metal shell medium base receptacles; key; catalog Nos. 7532, 7556 and 7558; 600 watts, 250 volts; catalog Nos. 611, 656 and 657; keyless; catalog Nos. 7533, 7557 and 7559; pull; catalog Nos. 95, 96 and 460.

Listed March 16, 1920.

Resistance Appliances.—The Cutler-Hammer Mfg. Co., Milwaukee, Wis.

"C-H." motor starter, 25 hp. or less; 550 volts or less; bulletin No. 9117. Speed controller, ¼ hp. or less; bulletin No. 3295.

Listed March 15, 1920.

Resistance Appliances.—The Cutler-Hammer Mfg. Co., Milwaukee, Wis.

"C-H." pressure-controlled speed regulators; self-starters; bulletin Nos. 7021, 9601, 9603 and 9716.

Listed March 16, 1920.

Resistance Appliances.—Meier Electric & Machine Co., Indianapolis.

Battery-charging rheostat and panel for use in automobile charging stations; maximum current 30 amperes, 250 volts; type R., 15-30.

Listed March 16, 1920.

Switches, Inclosed.—V. V. Fittings Co., Philadelphia.

"V. V." Types CSF and WSF; two, three and four-pole knife switches and cutout bases for standard plug or cartridge-inclosed fuses; inclosed in metal cases and designed for manual operation without opening cases; 30, 60 and 100 amperes, 125 and 250 volts, a. c. and d. c., and 500 volts, a. c.

Listed Dec. 11, 1919.

Switches, Pendent.—Hart Manufacturing Co., Hartford, Conn.

"Diamond H." single-pole pendent switches; push; catalog Nos. 700 and 702.

Listed Feb. 19, 1920.

Switches, Surface.—General Electric Co., Schenectady, N. Y.

"G. E." single-pole surface switches; catalog Nos. GE885-86.

Listed Feb. 10, 1920.

Transformers Bell-Ringing.—Schoenberg & Osgood, 327 South La Salle street, Chicago.

Air-cooled transformers designed to suppl current as following voltages: "Esseno," 40-60 cycles; primary, 110 volts; secondary, 6, 8 and 14 volts. For use only in ringing bells or for similar signaling work when wiring is installed in accordince with Class C rules of the National Electrical Code.

Listed March 5, 1920.

Transformers, Bell Ringing.—Empire Transformer Co., 2723 North Clark street, Chicago.

Air-cooled transformers designed to supply current at following voltages; for use only in ringing bells or for similar signaling work, when primary wiring is installed in accordance with Class C Rules, National Electrical Code. 60 cycles, primary 110 volts; secondary 8 volts. Type "Junior, single circuit"; secondary 6, 12, 18 volts. Type "3-circuit Junior."

Listed Nov. 22, 1919.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

Bender Electric Co., Trenton, N. J., is understood to be considering plans for the erection of a new plant to cost about $20,000.

DeLaval Steam Turbine Co., Trenton, N. J., has issued bulletin S, describing centrifugal pumps manufactured by the company for sugar-house service.

Appleton Manufacturing Co., 218 North Jefferson street, Chicago, has just issued bulletin No. 13 giving a complete listing of "Pagrip" metal moldings and fittings.

A. B. See Electric Elevator Co., Pacific avenue, Jersey City, N. J., has completed plans for the construction of an addition to its plant, estimated to cost about $16,000.

National Electric Supply Co., Washington, D. C., has had plans prepared for the remodeling of its plant at 1328 New York avenue. The work is estimated to cost about $100,000.

Bryant Electric Co., Bridgeport, Conn., is considering the construction of a 4-story addition to its plants on State street. The structure will be about 60 by 128 ft.

Philadelphia Insulated Wire Co., Third and Race streets, Philadelphia, Pa., recently organized to succeed the Alfred F. Moore estate, has completed arrangements for a stock issue aggregating about $1,100,000.

Robel & Bryant, Chicago, technical and trade advertising agents, have announced the removal of their offices to the Transportation building, 608 South Dearborn street, where larger quarters have been secured.

Hudson Wire Co., Inc., Ossining, N. Y., is understood to be arranging for the immediate construction of a new 1-story addition to its plant. The structure will be about 80 by 132 ft., and is estimated cost $35,000.

Collyer Insulated Wire Co., North Main street, Pawtucket, R. I., has awarded a contract for the construction of two 1-story additions to its plant. The structures will be of brick and mill type, about 25 by 77 ft. and 20 by 30 ft., and are estimated to cost $40,000.

Benjamin Electric Manufacturing Co., Chicago, is sending to the trade its bulletin No. 18 on the subject "Better Electric Lighting on the Farm." The bulletin describes in detail the Benjamin weatherproof outdoor fixtures, and reflectors, sockets and plugs for indoor use.

Standard Underground Cable Co., Westinghouse building, Pittsburgh, Pa., is sending bulletin No. 500 on "Standard Rubber Insulated Wire," to the trade. Full details and illustrations of the various kinds of wire manufactured by the company are given in the bulletin.

Crescent Insulated Wire & Cable Co., Olden street and Taylor avenue, Trenton, N. J., has taken out a building permit for the construction of a new 1-story steel structure on Ginder alley, estimated to cost about $50,000.

Structural Tool Co., Cleveland, O., announces the appointment of Charles F. Overly as general manager of sales.

Charles S. Overly.

Mr. Overly is well known in the pneumatic tool trade, having been connected with their manufacture for a number of years. He was president of the Overly Industrial Tool Co. up to the time that company combined forces with the Structural Tool Co.

Shapiro & Aronson, Inc., 20 Warren street, New York City, dealer in lighting fixtures, has been awarded a certificate of merit by the War Department. The citation on the certificate is as follows: "For making prompt deliveries and otherwise co-operating with the construction division of the army."

National Lamp Works of General Electric Co., Cleveland, O., has issued a large booklet on "Modern Lighting—Examples of Its Successful Application in the Industries," in which large half-tone cuts are used to show various methods of good lighting in large industrial plants, printing shops, engineering and business offices.

Bleadon-Dun Co., Chicago, manufacturer of the "Violetta" violet-ray machine and other therapeutic apparatus, has taken over the entire building at 213 South Peoria street. This gives the company 20,000 sq. ft. additional floor space and will give it a 150% increase in production. The company is outfitting the building with new equipment and machinery and started production in it May 1.

Auto Electric Shop, Newark, N. J., has filed notice of organization to operate at 1041 Clinton avenue, Irvington district, for the production of electric storage batteries. Joseph E. Eppel, 170 Laurel avenue, Irvington, heads the company.

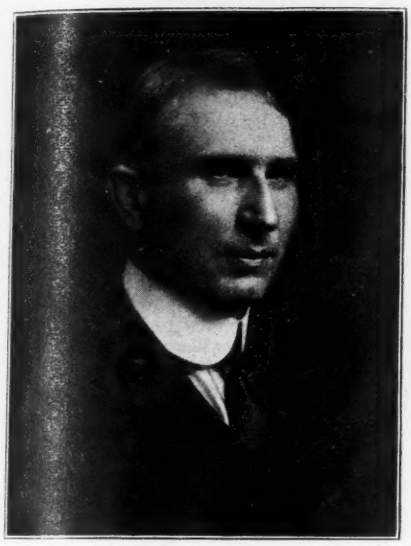
Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., in order to more fully co-operate with the shipping interests on the Atlantic coast, has established a division of its marine department at 165 Broadway, New York City. Frank F. Boyd and Norris R. Sibley are in charge of the department. During the recent war Mr. Boyd served as lieutenant-commander of the electrically propelled U. S. S. Jupiter and also as engineer and repair officer of the U. S. submarine base at New London, Conn. Mr. Sibley is also a war veteran, having served as a chief engineer in the army transport service.

Leeds & Northup Co., Philadelphia, Pa., has issued bulletin 857, which describes apparatus for automatic temperature control, particularly the control of medium and high temperatures in steel hardening furnaces, drawing furnaces, japanning and enamelling ovens, glass annealing ovens, etc. The temperature responsive device, a thermocouple, is measured by an automatic potentiometer, the needle of the galvanometer of which serves merely as a mechanical trigger to control the application of external power in adjusting the potentiometer circuit. The power which adjusts the potentiometer also makes and breaks contacts, by means of which circuits of standard commercial relays are opened or closed. These relays, in turn, control valves, rheostats, switches, etc., at the furnace oven, vat or kiln. The potentiometer mechanism is arranged to inscribe a record upon a large-scale chart, showing the results of its own regulating action upon the actual temperature of the thermocouple. It can also be arranged to operate signal lamps which will notify the operator should the temperature which is being regulated exceed certain bounds. Illustrations are shown of this system as used in the automatic temperature regulation of electrically heated japanning ovens in the plants of automobile manufacturers, and also in controlling the temperature of furnaces for tempering steel. By the use of two or more thermocouples and corresponding modifications of the temperature measuring and controlling mechanism, it is possible to hold two points at different temperatures or to hold one point, as the furnace at a given temperature, until a second point, as the work, has reached a predetermined temperature and then to throw over and hold the furnace at a lower fixed temperature.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

WALTER S. LANDIS, who recently was elected president of the American Electrochemical Society, was born at Pottstown, Pa., on July 5, 1881. He attended public school at Pottstown and



Walter S. Landis.

Orlando, Fla., before entering Bethlehem Preparatory School and Lehigh University, from which he was graduated as metallurgical engineer in 1902, and as master of science in 1906. During 1904-5 and 1909 he studied in Europe. Mr. Landis began his professional work as a teacher at Lehigh University. During his incumbency there he served successively as assistant instructor, instructor, assistant professor, and associate professor in the departments of mineralogy, metallurgy and electrometallurgy. He became chief technologist of the American Cyanamid Co. in 1912, the position he holds at present. He is a member of several technical societies and has contributed scientific articles to numerous publications. The societies of which he is a member include the American Electrochemical Society, American Chemical Society, American Institute of Chemical Engineers, American Institute of Mining and Metallurgical Engineers, and the Chemists Club of New York.

R. C. COFFY, manager of the Sapulpa Electric Co., Sapulpa, Okla., has been re-elected a director of the Rotary Club of that city.

COL. HERBERT A. JOHNSON has been elected vice-president in charge of production of Landers, Frary & Clark, New Britain, Conn.

J. J. BLOOMER, assistant to the president of the American Steel & Wire Co., Chicago, has accepted the position of traffic manager of the Milwaukee Association of Commerce. He will assume his new duties June 1.

GEORGE ROSENBERGER, Manassas, Va., has been elected manager of the Herndon Electric Light & Power Co., of Herndon, Va.

H. L. MITCHELL, general manager of the West Penn Railways Co., Pittsburgh, Pa., has been elected vice-president of the company.

R. A. PATERSON has been made district sales agent of the Copper Clad Steel Co., Rankin, Pa., with offices at 30 Church street, New York City.

GEORGE M. E. VANS has been appointed chief electrical engineer of the Pittsburgh, Harmony, Butler & New Castle railway, Pittsburgh, Pa.

W. A. MOSER has been appointed branch manager of the Salt Lake City office of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

W. H. SCHACKMAN, formerly construction superintendent of the Oklahoma Gas & Electric Co., at Enid, Okla., has been appointed superintendent of the Sapulpa (Okla.) Electric Co.

JOSEPH MCKINLEY, who has been manager of power sales for the Duquesne Light Co., Pittsburgh, Pa., for several years, has been appointed general contracting agent for the company.

FREDERICK G. PLATT, vice president of the Meriden Cutlery Co., operated by Landers, Frary & Clark, at Meriden, Conn., has been made chairman of the board of directors of the New Britain Machine Co., New Britain, Conn.

J. C. JONES, formerly branch manager, of the Salt Lake City office of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has been appointed manager of the supply division, of the Los Angeles office of that company.

DR. VAN H. MANNING, director of the bureau of mines, Department of the Interior, has tendered his resignation, effective June 1, to President Wilson. Dr. Manning is leaving the government service to accept a position as director of research with the recently organized American Petroleum Institute.

F. W. WITTIG, formerly head of the electrical engineering and physics department at the University of Alabama, and later assistant professor at the University of Pennsylvania, has been appointed assistant professor of electrical engineering at the Sheffield Scientific School at Yale University, New Haven, Conn.

L. BRANDENBURGER, formerly located in the Walker Bank building, Salt Lake City, has taken over larger quarters at 59 West Broadway, that city, and will act as sales representative of the Cutler-Hammer Manufacturing Co., Milwaukee, Wis., in the territory covered by Utah, the western section of Wyoming and three-quarters of the state of Idaho.

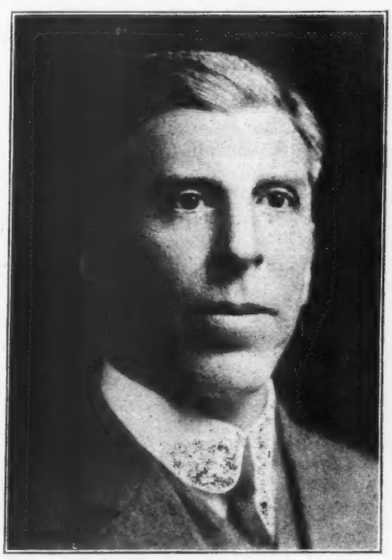
OBITUARY.

HENRY P. ERWIN, treasurer of the Brooklyn Edison Co., Inc., died suddenly, April 24. He was 55 years of age.

ARTHUR B. BELLOWS, general manager of the Pittsburgh Testing Laboratory, died recently at his home in Pittsburgh. He was a graduate of Walpole Academy, Phillips Academy and the Massachusetts Institute of Technology.

GEORGE W. KETTER, who was in charge of the electrical installations for the Electric Furnace Construction Co., Philadelphia, died at Claremont, N. H., on April 22, after a short attack of pneumonia. Mr. Ketter was a graduate of the Carnegie Technical School.

CHARLES W. JOHNSON, assistant director of engineering for the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., died of double pneumonia April 21, 1920. Mr. Johnson was born June 30, 1874, and was graduated from the Ohio State University in 1896. He then entered the employ of the Steel Motor Co., Johnstown, Pa. Later he became superintendent of the Allis-Chalmers Bullock Co., Cincinnati, O. He entered the employ of the Westinghouse company in 1907 and was soon



Charles W. Johnson.

appointed chief inspector. In 1912 he became general superintendent of the East Pittsburgh works and in the early part of 1919 was made assistant manager of works. On Jan. 1, 1920, he was appointed assistant director of engineering. Mr. Johnson was a member of the American Society of Mechanical Engineers, the American Institute of Mining Engineers and the Engineering Society of Western Pensylvaia.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

North Stratford, N. H.—A contract has been awarded by the Warner Sugar Refinery Co., 79 Wall street, New York City, for the construction of a 1-story power plant, about 75 by 80 ft., in connection with the erection of a new addition to its local plant. The Snare & Triest Co., 8 West 40th street, New York City, is the contractor.

Providence, R. I.—The Providence Telephone Co. has filed notice of an increase in its capital stock to $10,000,000, for general business expansion.

Auburn, N. Y.—Superintendent of Prisons C. F. Rattigan, Albany, is having plans prepared for the construction of a new lighting and central heating plant at the Auburn State prison, estimated to cost about $75,000.

Brooklyn, N. Y.—The Brooklyn Edison Co., 360 Pearl street, has had plans prepared for the construction of a new 1-story brick power plant, to be located on Grand avenue, north of Prospect place. The structure will be about 38 by 102 ft., utilized for increased capacity, and is estimated to cost $40,000.

Brooklyn, N. Y.—The Hunter Illuminated Car Sign Co., Linden avenue, has completed arrangements for alterations and improvements in its plant, about 49 by 84 ft., located at Linden and Bayside avenues. The work is estimated to cost about $6000.

Dunkirk, N. Y.—The Atlas Crucible Steel Co. plans to increase the size of its plant. Among the improvements will be a transformer building, 40 by 140 ft. The estimated cost of all improvements is $1,800,000.

Hamilton, N. Y.—The village council has sold the municipal electric light plant to the White Co., Norwich. The company plans to build additions and extensions and install new generating equipment.

Lancaster, N. Y.—The Depew & Lancaster Light, Power & Conduit Co. has had plans prepared for extensive improvements and extensions in its plants and system, estimated to cost approximately $250,000. The proposed work includes the erection of a new addition to its local substation, with the installation of necessary equipment; addition to its substation at Hamburg; extensions in the street-lighting system; improvements in its distribution system; extensions in its present pole lines for the serving of increased territory; the construction of a new brick administration building, and other work. The company has filed application with the Public Service Commission for permission to proceed with this work, as well as for the approval of the issuance of bonds for $50,000 and $210,000 in preferred stock, the proceeds to cover the cost of the expansion.

Medina, N. Y.—The Public Service Commission has granted permission to the Western New York Utilities, Inc., to construct and operate electric plants in the towns of Kendall, Hamlin and Barre, N. Y. C. S. Swett is the treasurer of the company.

New Berlin, N. Y.—The Berholme Power Co., Inc., plans a hydroelectric development on the Unadilla river, to include a power house, generating unit and transmission lines at an estimated cost of $19,900.

New York, N. Y.—The New York Edison Co., Irving place and 15th street, has awarded a contract to the Northeastern Construction Co., 101 Park avenue, for the construction of the proposed new transformer station at Inwood and Cromwell avenues.

North Tonawanda, N. Y.—The Tonawanda Power Co., Sweeney building, has awarded a contract to Morris & Allen, Inc., Builders exchange, Buffalo, for the erection of a new machine shop at 447 Robinson street. The structure is estimated to cost about $15,000.

Rome, N. Y.—The Board of Managers of the State School for Mental Defectives is understood to be arranging for the construction of a new lighting and central heating plant at the institution, estimated to cost about $120,000.

Rome, N. Y.—Arrangements are being made by the city water and sewer board for the construction of a new hydroelectric power plant on the Mohawk river at Ridge Mills, near Rome, estimated to cost about $65,000. C. W. Knight, 101 West Liberty street, is the engineer on the project.

Rossie, N. Y.—G. N. Wilson and associates have recently made application to the Public Service Commission, Albany, for permission to construct and operate a hydroelectric power plant on Indian river.

Salamanca, N. Y.—The Salamanca Panel Co., plans to install a 200-hp. electrically driven plant, and is in the market for two 50-hp. motors, one 15-hp. motor, five 10-hp. motors and several 5-hp. motors.

Watertown, N. Y.—The Beebe Island Utilities Co. has awarded a contract for the erection of a hydroelectric plant on Beebe island, near Watertown, estimated to cost close to $1,000,000, including machinery and equipment.

Bayonne, N. J.—Plans are under consideration for the installation of a new "white way" electric street-lighting system on Broadway, from 26th street north. The Uptown Improvement Association, recently organized, with headquarters at 718 Broadway, is interested in the project.

Harrison, N. J.—The Otis Elevator Co., First street, has filed notice of an increase in its capitalization from $16,500,000 to $21,500,000, to provide for general business expansion.

Jersey City, N. J.—Plans are being arranged by the Central Railroad of New Jersey for the construction of a large electric power plant of about 4000-kw. capacity in connection with its proposed new terminal in the Greenville section of this city. The company has inaugurated construction work on the initial unit, to comprise a 3000-ft. wharf built near the foot of Chapel avenue. Upon completion of this structure, an ore unloading plant will be erected, as well as two unloading units for initial work, with duplication of this installation at a later date. Large quantities of mechanical equipment will be required, it is understood, and the company's plans include the installation of an electrically operated gantry crane of 30-ton capacity covering four tracks, to be located on the shore end of the pier. A number of other electrically operated traveling cranes will also be installed. The proposed new terminal will cover about 500 acres of land when completed, and will be about seven times the size of the unit now under way.

Jersey City, N. J.—The Safety Car Heating & Lighting Co., 206 Erie street, manufacturer of electric-lighting equipment and systems, has arranged for the disposal of its local plant and property, including is a number of buildings to the Erie Railroad Co. The company is planning for the removal of its plant in the early fall to New Haven, Conn. The plant has been operating for over 20 years in Jersey City with a force of about 500 men engaged at the present time.

Jersey City, N. J.—The Whitlock Cordage Co., Communipaw avenue, has completed arrangements for the construction of an extension to its power plant. The structure will be used for general factory service in connection with the proposed additions to the works of the company to cost about $120,000.

Newark, N. J.—The Natural Carbonic Gas Co., McClelland street, has awarded a contract to John Cooper, 45 Clinton street, for the construction of a boiler room and engine plant addition to its works, estimated to cost $30,000.

Newark, N. J.—John Campbell & Co., 75 Hudson street, New York City, has awarded a contract to Joseph Jewkes & Sons, 676 Montgomery street, Jersey City, for the construction of a new 1-story dye plant addition to their plant at Plum

Point lane and Avenue P. A power plant for factory service will also be erected.

Pleasantville, N. J.—In connection with the construction of the proposed municipal sewerage disposal plant to cost about $97,000, contract for which has been awarded, arragements have been completed whereby the pumping station and screening department will be erected at a cost of $42,000. Considerable mechanical and electrical equipment will be required.

Trenton, N. J.—The Agasote Millboard Co., Fernwood street, is understood to be making rapid progress on the construction of the new boiler plant at its works, to cost about $15,000, for increased power facilities.

Allentown, Pa.—In connection with the construction of the proposed new local plant of the Allen Tire & Rubber Co., estimated to cost in excess of $500,000, a large power plant will be constructed for factory service. The new works, when completed, will comprise four units and will afford employment for over 2500 persons. The company has recently filed notice of an increase in its capital stock from $1,000,000 to $2,500,000.

Beaver Falls, Pa.—The Keystone Co. is erecting additions to its plant involving an outlay of about $200,000. The additions include an electrically operated steel foundry, 80 by 120 ft. and a machine shop, 80 by 110 ft.

Carlisle, Pa.—Ernest & Herman Levy, Fourth avenue and 19th street, New York City, manufacturers of ribbons, are having plans prepared for the construction of a new 1-story factory and boiler plant, about 50 by 194 ft., estimated to cost $30,000.

Philadelphia, Pa.—The Navy Department, Washington, D. C., is planning for improvements and extensions in the League Island Navy Yard, Philadelphia, during the coming year, and the naval bill, as now written, places the estimated expenditures at $17,268,360. Of this $2,500,000 will be utilized for steam engineering service, $11,000,000 for construction and repair work, and $1,000,000 for supplies.

Philadelphia, Pa.—The Philadelphia Electric Co. has awarded a contract to the John R. Wiggins Co., Otis building, for the construction of its new distributing station at 52 North Sixth street, to be known as the Franklin substation. The structure is estimated to cost about $300,000. The company has also awarded a contract to the same concern for the erection of the proposed 1-story brick addition to the Marshall substation, to cost about $125,000.

Philadelphia, Pa.—The State Public Service Commission has approved the purchase by the Counties Gas & Electric Co., Philadelphia, of the Upper & Lower Salford Electric Light Co.

Philadelphia, Pa.—The H. S. B. W.-Cochrane Corp., 17th and Allegheny streets, has awarded a contract to the William Steele & Sons Co., 1600 Arch street, for the construction of a new 1-story addition to its building on Lippincott street. The structure is estimated to cost about $35,000.

Philadelphia, Pa.—McCray & Hunter, 3525 Germantown avenue, have awarded a contract for the construction of a new 1-story brick cold storage plant at Warnock and Venango streets, estimated to cost about $25,000. Considerable refrigerating and electrical apparatus will be utilized.

Philadelphia, Pa. — The Franklin Sugar Refining Co., 125 South Orianna street, has awarded a contract for alterations and improvements in the boiler plant at its works at Reed and Meadow streets. The work is estimated to cost about $5000.

Philadelphia, Pa.—The Prest-O-Lite Co., 30 East 42nd street, New York City, is understood to be considering plans for the construction of a large new brick and reinforced concrete manufacturing plant to be located on Tulip street, near Frankford creek, Philadelphia. The proposed works are estimated to cost in excess of $3,000,000, including machinery and equipment.

Philadelphia, Pa.—John M. Greene, 261 Drexel building, is in the market for a 20-hp., 220-volt, d-c., single-drum contractor's hoist complete with solenoid brake, controller and resistance.

Baltimore, Md.—Thomas Charles Williams, 8 East Lexington street, desires bids on electrical equipment for an office building.

Bedford, Va.—The city has approved a bond issue of $150,000, the proceeds to be used for improvements and extensions in the municipal electric light, power and waterworks plants. C. A. Moore is the city treasurer.

Wheeling, W. Va.—The Wheeling Public Service Co. has completed negotiations for the purchase of the holdings of the West Virginia Traction & Electric Co., following a recent receiver's sale. The consideration was about $60,000.

Asheville, N. C.—Elton Warner, 150 Cumberland avenue, is in the market for a small waterwheel and electric generator for use in connection with storage batteries.

Gastonia, N. C.—The city is arranging plans for the issuance of bonds for $285,000, the proceeds to be used for the enlargement of the municipal electric light, power and waterworks plants, and the installation of the necessary equipment. S. G. Fry is the city clerk.

Pittsboro, N. C.—The town council is having plans prepared for the installation of a new municipal electric-lighting system.

Timmonsville, N. C.—The City Gas & Electric Co. is understood to be considering plans for the rebuilding of its electric power plant recently destroyed by fire.

Columbia, S. C.—The state legislature has appropriated $50,000 for the installation of a new heating and lighting plant in the state capital. S. W. Cannon is the state electrician.

NORTH CENTRAL STATES.

Alger, O.—The city plans to build a municipal electric light plant at an estimated cost of $10,000.

Batesville, Ind.—John K. Johnson has purchased the Batesville Telephone Co. and plans to install additional equipment.

Indianapolis, Ind.—The Ross Power Equipment Co., 617 Merchants Bank building, is in the market for two 75 or 100-kw., 240-volt, 60-cycle, three-phase, belted generator or engine sets with switchboard and exciter and one 300-500 kw., 480-2300-volt, three-phase, turbocondenser.

Chicago, Ill.—The International Engineering & Manufacturing Co., 204 West Randolph street, Chicago, Ill., has bought 95 acres of land in Kokomo, Ind., and will erect a plant for the purpose of manufacturing power machinery for farms.

Chicago, Ill.—The Flexible Steel Lacing Co., 522 South Clinton street, manufacturer of steel belt lacing and lamp guards, has let a contract for an addition to its plant 126 by 260 ft., to cost $175,000.

Rock Island, Ill.—The Western Rock Island County Power Co. has been granted franchises to erect and maintain transmission lines on state-aid roads in Rock Island county.

Springfield, Ill.—The St. Nicholas Hotel will install a new heat, lighting and power plant at an estimated cost of $20,000.

Farmington, Mich. — The village plans to install an electrically driven auxiliary pumping unit and construct extension to water mains at a total estimated cost of $25,000. R. A. Murdock, 603 Free Press building, Detroit, Mich., is the engineer in charge of the project.

Appleton, Wis.—The Interlake Pulp & Paper Co. is having plans prepared for a 2-story general machine and repair shop, 75 by 140 ft., to cost $50,000.

Beloit, Wis.—Included in the equipment of the new Eclipse works of the Fairbanks-Morse & Co., Chicago, now building at Beloit at a total cost of $2,000,000, will be 24 electric cranes ranging in capacity of from 5 to 25 tons.

Cudahy, Wis.—The Ladish Drop Forge Co. has increased its capital stock from $300,000 to $700,000 to finance the development of its plant and business.

Fond du Lac, Wis.—The Eastern Wisconsin Railway & Light Co. will soon start work on a large new power house. A bond issue of $1,200,000 is to finance the building of the plant and other improvements at Sheboygan and Oshkosh.

St. Louis, Mo.—The Crunden-Martin Manufacturing Co. will equip a plant to cost about $500,000 for the manufacture of enamel ware. Automatic machinery will be installed.

Scammon, Kan.—The city has voted $6000 in bonds for improvements in the municipal electric light system.

Dell Rapids, S. D.—A new street-lighting system consisting of 136 ornamental one-light standards is now in use.

Binford, N. D.—The town has voted $8000 in bonds for the establishment of an electric light and power plant.

Fargo, N. D.—The Northern States Power Co. has closed a contract with the city government covering the electrical energy requirements of the municipal water pumping system.

SOUTH CENTRAL STATES.

Paducah, Ky. — Paducah Electric Co. is understood to be arranging plans for a bond issue, the proceeds to be used for improvements and extensions in its plant. The company proposes to install new equipment. to provide for increased capacity.

Birmingham, Ala.—In connection with the proposed additions to be constructed at the plant of the Concrete Steel Co., Brown-Marx building, considerable mechanical equipment, etc., will be required. It is planned to install a 65-ft. electric crane.

Lexington, Miss.—The city has awarded a contract for the installation of a new municipal electric light plant. Williams & Lebby, Yazoo City, Miss., are the engineers on the project.

Minden, La.—The city is planning for a bond issue of $60,000, the proceeds to be used for improvements in the municipal electric light and water plants.

Enid, Okla.—The Oklahoma Gas & Electric Co. will extend its lines to supply electrical energy to several oil refineries near Enid.

Albany, Tex.—The citizens of Albany have subscribed $25,000 for the building of an electric light plant.

Canadian, Tex. — The Canadian Water, Light & Power Co. is having plans prepared for the construction of a new transmission system to cover approximately 28 mi. Edward Hoover, Jr., is the manager of the company.

Dallas, Tex.—In connection with the proposed expansion of the Dallas Light & Power Co., contract has been awarded to the Texas Construction Co., Dallas, for the erection of a new plant addition to cost about $100,000. C. W. Davis is vice-president and general manager of the company.

Tulia, Tex.—The city plans to build an electric light and water plant. For further information address the city clerk.

WESTERN STATES.

Alameda, Cal.—The city council is having plans and specifications prepared for the construction of a new electric substation at Atlantic and Webster streets.

Los Angeles, Cal.—The city council has awarded a contract to the Southern California Electric Co. for the installation of a new electric street-lighting system of ornamental type on Norton avenue, between First and Third streets.

Oakland, Cal.—The Pacific Gas & Electric Co. is understood to have completed arrangements for the installation of a 16,000-hp. steam-operated electric turbine at its local plant, which unit will practically double the present capacity of the power station.

Oakland, Cal. — The Kream of Kream Co. is understood to have completed plans for the installation of a quantity of refrigerating apparatus and ice cream manufacturing machinery for its plant at 57th and San Pablo avenues.

Oakland, Cal.—Plans are under consideration by the Edwin Forrest Forge Co. for the immediate installation of electrically operated machinery and equipment at its plant.

Oakland, Cal.—The Standard Oil Co. has completed the installation of electric motors and other electrical equipment in its new establishment comprising a number of buildings on Castro avenue, Richmond district. About 3450 hp. will be required, this to be furnished from the new substation of the Great Western Power Co. now in course of construction at Pullman avenue, Richmond.

Oakland, Cal.—Arrangements have been completed by the management of the Hotel Oakland to award a contract to the Great Western Power Co. for furnishing hydroelectric power for general service. Machinery and equipment for this purpose will be installed at once.

Pittsburg, Cal. — The National Metals & Chemical Co. is having plans and specifications prepared for the immediate installation of a new electric furnace at its plant, to duplicate the present installation of this character. The works are operated under the management of A. Sloss, Jr., of the Alaska Commercial building, San Francisco.

San Bernardino, Cal. — The city council has authorized the preparation of revised plans and specifications for the installation of a new ornamental electric street-lighting system on Third street. W. L. Brown is city engineer in charge of the work.

San Francisco, Cal.—The Western States Gas & Electric Co. has been granted permission by the State Railroad Commission to issue stock for $603,000, a portion of the proceeds to be used for improvements and expansion in its plants and system. The company operates in the vicinity of Richmond, Stockton, and Eureka.

San Francisco, Cal.—The Pacific Gas & Electric Co. is understood to be arranging plans for its expansion program for about two years to come, the proposed improvements and extensions being estimated to cost approximately $15,000,000. The company has filed application with the State Railroad Commission to issue temporary certificates for $10,000,000. the proceeds to be used to defray a portion of the expenses of the proposed work.

West Berkeley, Cal.—The Dro Separator Co. has recently inaugurated work on the construction of a large new transformer building at its plant. The company has had plans prepared for the construction of additions to increase the present capacity of the works, including the installation of considerable electrical and mechanical equipment, and when completed the plant will have a capacity of about 1000 hp. in power drive.

West Berkeley, Cal.—Work is progressing rapidly at the plant of the Vegetable Oil Co., a new organization, located at the foot of Snyder street. The company will have an electrical installation of about 1162 hp.

West Oakland, Cal.—Work is progressing rapidly at the plant of the National Ice Co. on the installation of new electrical machinery and equipment for increased operations. The works are located at Third and Wood streets.

NEW INCORPORATIONS.

New York, N. Y.—The Presto Electric Co.. Capital stock, $5000. To manufacture electrical goods. Incorporators: F. Kaiser, M. Altschuler, and M. M. Goldschmidt, 299 Broadway.

New York, N. Y.—The A. & S. Motor Products Corp. Capital stock, $10,000. To manufacture motors, motor parts, etc. Incorporators: M. Schloss, S. Abramson, and B. S. Black, 160 West 95th street.

Trenton, N. J.—The Holmes-Hilton Co., Inc. Capital stock, $50,000. To manufacture electric storage batteries, etc. Incorporators: Frank Holmes, Jr., and Ernest and Samuel Hilton.

Wilmington, Del.—The Automotive Electric & Manufacturing Co., Inc. Capital stock, $10,0000. To manufacture electrical devices, etc. Incorporators: M. A. Bruce, T. L. Croteau and C. H. Blake.

Charleston, W .Va.—The Gauley Oil & Gas Power Co. Capital stock, $200,000. To operate electric and other utilities. Incorporators: J. B. Chapman, R. H. Grosscup, P. B. Bigger, Charleston; D. McClung, Ansted, and T. J. Davis, Montgomery.

Pineville, Ky.—Watt & Co., Johnson building. Capital stock, $15,000. To manufacture electrical equipment. Incorporators: P. E. Nuckols, R. M. Watt, and N. R. Patterson.

Union, S. C.—The Gilliam Light & Motor Co. Capital stock, $25,000. To manufacture isolated light and power plants, etc. D. Fant and J. Louis Gilliam head the company.

Baltimore, Md.—The Victory Storage Battery Co., Maryland Casualty building. Capital stock, $310,000. To manufacture electric storage batteries, etc. Incorporators: A. J. Thompson, Edward B. Masterman, and Henry Stockbridge, 3rd.

Richmond, Va.—The Home Light & Power Co. Capital stock, $150,000. To manufacture electrical appliances. S. O. Lindeman, Richmond, is president, and L. R. Lindeman, Raleigh, N. C., is secretary.

Buffalo, N. Y.—Morrow Electric Co. Capital stock $20,000. To manufacture electrical goods. Incorporators: J. S. and E. Morrow, and E. S. Fenwick, Buffalo.

Massey, Md. — Massey Electric Light & Power Co. Capital stock $5,000. To operate a local electric light and power plant. Incorporators: L. Carroll Clark, E. T. Massey, and S. W. Granberry.

Baltimore, Md.—Baltimore Battery Separator Co., 23 East Center street. Capital stock $10,000. To manufacture electric batteries, etc. Incorporators: Thomas H. Snowden, Edward A. Garlock, and Lawrence Thompson.

New York, N. Y.—The Royal Metal Lighting Fixture Co. has been incorporated with $15,000 capital stock by D. and A. Swartz and M. Brown, 224 Linden street.

What Publishers Are Doing

Publishers of today are manufacturers. Into their finished product go vast quantities of expensive raw material, an extraordinary amount of costly skilled labor, and a great deal of brain.

Their output, nowadays of a higher quality than ever before in the world's history, constantly and regularly produced and widely distributed, is very properly recognized as a tremendous factor in the successful merchandising of nearly every other manufactured article.

No other manufacturers have been beset and badgered by such exasperating difficulties as have fallen to the lot of publishers.

It is not alone the high and uncertain price of newsprint and other material, but, all too often, a question of any supply at all.

Their labor problem never deserts them for a moment. Wages have mounted to points to which salaries never aspired in days gone by, and salaries have gone figure-mad.

They must face and fight their way constantly through the same transportation troubles that others battle with occasionally.

The newspapers are standing loyally and faithfully on tried and true precepts and principles. Their vigilance and the searchlight they constantly bring to bear does much to assure public safety now. Eventually the return of sanity and reason to lines of public thought will come all the more quickly and surely because the multitude of real newspapers of the land have not wavered nor wobbled.

They are teaching courage, cheer, optimism and faith in our established institutions. They are spreading the doctrine of Americanism with its uplifting message of equality and opportunity. They are proving that religious and political liberty is a fact and not a theory, whenever and wherever the sowers of seeds of discord and discontent poke their dastardly faces.

The advertising manufacturer, his advertising agency, the advertising fraternity generally, owe to publishers a greater, more cheerful and active spirt of helpfulness than ever before.

Moss-covered customs and precedents that hamper and restrict the publishers should be forgotten. Selfish requirements and demands founded thereon, that serve only to put obstacles in the publishers' way and prevent better service to all, should be taboo.

This is a new day, with new conditions, situations, and problems, and they are best met and most satisfactorily solved in every line of business by those of vision and mind who can see beyond the moment and think without the accompaniment of a precedent.

The newspaper publishers have truly earned and richly deserve unhesitating and unstinted support.

The above statement made in Printers' Ink by the John Budd Company, New York, applies with equal force and with but slight variations to trade and technical journals. I wonder how many advertisers and readers really appreciate what these papers stand for; what a driving power they are for industrial progress; how they stabilize and energize trade conditions, and what a vital part they play in the life of the business community. Their existence constitutes part of the assets of every manufacturer in the field today; their service is a big element in his prospects for tomorrow.

C. A. TUPPER, President,
International Trade Press, Inc., Chicago.

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

Standard Gas & Electric Co. Earns $7.68 on Preferred Stock.

The Standard Gas & Electric Co. has issued its annual report for the year ended Dec. 31, 1919, showing surplus after charges and taxes of $1,902,114, equivalent to $7.68 a share ($50 par value, earned on the $12,379,850 outstanding preferred stock, as compared with net income of $733,743 or $3.34 a share earned on the $11,784,950 preferred stock in 1918. The income account for the year ended Dec. 31, 1919, compares as follows:

	1919.	1918.
Gross revenue	$3,040,988	$1,618,566
Net after taxes	2,960,896	1,574,927
Other income	.....	.....
Total income	$2,960,896	$1,574,927
Investment charges	993,782	786,184
Amortization debt discount	65,000	55,000
Surplus after charges	1,902,114	733,743
Preferred dividends	939,568	707,097
Surplus	$ 962,546	$ 26,646

The consolidated balance sheet as of Dec. 31, 1918, compares as follows:

ASSETS.

	1919.	1918.
Securities owned	$43,481,838	$33,468,069
Cash	123,661	340,779
Accounts received from subsidiary companies	1,349,353	615,203
Notes received from subsidiary companies	734,534	874,666
Accounts receivable	36,907	69,842
Notes receivable	144,097	200
Prepaid interest and taxes	.....	.....
Dividends received	1,102,193	209,662
Accrued interest	81,853	55,181
Office furniture	1	1
Sinking fund	74,847	65,352
Deferred charges	1,325,773	962,373
Total	$48,455,087	$36,661,319

LIABILITIES.

Preferred stock	$12,379,850	$11,784,950
Common stock	12,679,550	9,343,150
Funded debt	19,059,200	13,270,200
Preferred dividend script	.....	202,663
Notes payable	1,344,571	275,000
Accounts payable	770,961	254,626
Accrued accounts	214,835	153,229
Accrued dividends	82,532	58,925
Surplus	1,923,588	1,318,576
Total	$48,455,087	$36,661,319

Pacific Gas & Electric Sells $10,000,000 Note Issue.

The new $10,000,000 note issue by Pacific Gas & Electric Co. just authorized by the California Railroad Commission is convertible into common stock at 80. It is understood that the issue has already been sold to a syndicate of San Francisco bankers. The company will proceed with Pitt River water power project which has been held up for more than two years, on account of the great shortage of electric energy on the coast. The Pitt River undertaking, it is estimated, will provide from 60,000 to 75,000 additional hp. when completed. Demands for power on the company are in excess of its present capacity.

Utah Securities Corp.

Earnings of subsidiary companies controlled by the Utah Securities Corp. for January and the twelve months ended Jan. 31, 1920, compare with 1919 as follows:

	1920.	1919.	Changes. Increase.
Jan. gross	$ 728,635	$ 626,868	$101,767
Net earnings	363,266	341,631	21,635
Twelve months' gross	7,432,719	6,999,165	433,554
Net earnings	3,792,674	3,740,808	51,866

Northern States Power Co. Shows 17.67% Gain in Gross.

Gross earnings of the Northern States Power Co. in 1919 increased 17.67% over the preceding year and net earnings increased 16.21%, as shown by the annual report just isued by President H. M. Byllesby. These gains were the result of additional business, there having been no rate increases of consequence during the year. The earnings statement for the year 1919 compared with 1918 is as follows:

	1919.	1918.
Gross earnings	$9,875,934	$8,392,664
Net earnings	4,117,312	3,542,974
Fixed charges	1,999,055	1,922,713
Balance	2,118,256	1,620,260
Preferred dividends	1,176,998	1,036,915
Balance available for amortization, depreciation and common dividends	941,258	583,345

The entire balance of net income for 1919, after payment of preferred stock dividends and the setting aside of necessary sums for depreciation and amortization, was credited to surplus. No dividends were paid on the common stock during 1919. Depreciation and other reserves, as well as surplus earnings have been reinvested in betterments and improvements to the property. Expenditures for new construction in 1919 amounted to $3,455,930.

Light and power service was extended to 20 additional towns, bringing up the total number of communities served to 233, with an estimated population of 1,022,000. The holdings of the company's preferred stock in the territory where it operates now average approximately $10 per capita of the population served. Up to April 1, 1920, there had been 15,352 local sales of such stock, aggregating $8,034,000 par value.

Newport News & Hampton Railway, Gas & Electric Co.

Earnings of the Newport News & Hampton Railway, Gas & Electric Co. for February and the two months ended Feb. 29, 1920, compare with corresponding period in 1919 as follows:

	1920.	1919.
February gross	$ 193,677	$ 188,701
Net after taxes	20,482	31,983
Total income	20,631	31,980
Surplus after charges	*5,318	8,216
Two months' gross	414,577	408,027
Net after taxes	42,857	71,864
Total income	43,011	71,922
Surplus after charges	*9,007	26,446

*Deficit.

United Light & Railways Co.

Earnings of the United Light & Railways Co. and subsidiaries, for the 12 months ended Feb. 29, 1920, compare with 1919 as follows:

	1920.	1919.	Changes. Inc.
12 months' gross	$10,640,278	$9,597,049	$1,043,228
Net aft. taxes.	2,984,453	2,812,347	172,105
Surplus after fixed chgs.	1,175,854	1,091,643	84,210
Balance after pfd. divs.	571,174	484,539	86,634

Dividends.

The Fort Worth (Tex.) Power & Light Co. has declared its regular quarterly dividend of 1¾% on the preferred stock, payable May 1 to stockholders of record April 20.

The Western States Gas & Electric Co. has declared its regular quarterly dividend of 1¾% on the preferred stock, payable April 15 to stockholders of record March 31.

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

Public Utilities—	Div. rate. Per cent.	Bid Apr. 27.	Bid May 4.
Adirondack Electric Power of Glens Falls, common	6	10	9
Adirondack Electric Power of Glens Falls, preferred	6	71	69
American Gas & Electric of New York, common	10+extra	115	114
American Gas & Electric of New York, preferred	6	37	37
American Light & Traction of New York, common	..	155	150
American Light & Traction of New York, preferred	6	85	84
American Power & Light of New York, common	4	58	58
American Power & Light of New York, preferred	6	70½	69
American Public Utilities of Grand Rapids, common	..	5	5
American Public Utilities of Grand Rapids, preferred	7	12	12
American Telephone & Telegraph of New York	..	102	101
American Water Works & Elec. of New York, common	..	2	2
American Water Works & Elec. of New York, particip	7	7	7
American Water Works & Elec. of New York, first preferred	..	45	37
Appalachian Power, common	..	1	1
Appalachian Power, preferred	7	15	15
Cities Service of New York, common	+extra	375	350
Cities Service of New York, preferred	6	68	67
Commonwealth Edison of Chicago	8	102	101
Comm. Power, Railway & Light of Jackson, common	..	20	19
Comm. Power, Railway & Light of Jackson, preferred	6	40	41
Federal Light & Traction of New York, common	..	6	6
Federal Light & Traction of New York, preferred	..	44	44
Middle West Utilities of Chicago, common	..	18	18
Middle West Utilities of Chicago, preferred	..	36	37
Northern States Power of Chicago, common	..	45	42
Northern States Power of Chicago, preferred	ex.div.7	85	82
Pacific Gas & Electric of San Francisco, common	..	52	53
Public Service of Northern Illinois, Chicago, common	7	83	79
Public Service of Northern Illinois, Chicago, preferred	6	79	78
Standard Gas & Electric of Chicago, common	..	17	16½
Standard Gas & Electric of Chicago, preferred	6	38	38
Tennessee Railway, Light & Power of Chattanooga, common	..	1	1
Tennessee Railway, Light & Power of Chattanooga, preferred	6	5	4
United Light & Railways of Grand Rapids, common	4	23	23
United Light & Railways of Grand Rapids, preferred	6	60	59
Western Power of San Francisco, common	..	14	15
Western Union Telegraph of New York	extra	80	79
Industrials—			
Electric Storage Battery of Philadelphia, common	4	105	102
General Electric of Schenectady	8	175	170
Westinghouse Electric & Mfg. of Pittsburgh, common	7	52	53